The Therapeutic Gazette

Whole Series, Vol. XLV | DETROIT, MICH., DECEMBER 15, 1921 | Third Series, Vol. XXXVII, No. 12

Original Articles

Observations of the Continued Use of Luminal in Individual Cases of Epilepsy

BY J. ALLEN JACKSON, M.D.

AND

GEORGE B. M. FREE, M.D.

Superintendent and Assistant Superintendent respectively of the State Hospital for the Insane, Danville, Pa.

Many contributions made on the subject of luminal in the treatment of epilepsy have well established the use of the drug in the treatment of this disease. The drug is now not only being used by the alienist and neurologist, but to a great extent by the general practitioner of medicine. That the drug controls to a definite degree the seizures, that the administration of the drug over short periods of time produces no untoward effects, and that a definite dosage has been established for these cases, are well-recognized facts.

The objects of the study of the cases herein cited were:

1. For the purpose of determining the effects on certain types of mental cases, whose postepileptic furor and confusional state have made them trying hospital problems.

2. To observe the effects of the long-continued use of the drug on epileptic seizures.

3. To observe the effects which might arise after long usage.

4. To observe the effects of the withdrawal of the drug.

Twelve cases were selected in the male and female wards for treatment. Our preliminary observations conincide practically with a number of writers as far as the reduction in the number of seizures, dosage, and absence of untoward effects are concerned. Five of these cases in the male department, however, were continued on the treatment and subsequent observations made for a period of nine months. The table shows the number of seizures occurring, in monthly periods, prior to administration of the drug, number of seizures during treatment, dosage used, and number of seizures occurring after the withdrawal of the drug.

Chart 1 represents a case of long standing and shows the convulsion curve prior to the administration of luminal, and a distinct decline of the curve during the first month's treatment under one and one-half (1½) grains dosage daily. During the second, third and fourth months convulsion curve ascends, but does not reach the peak. Under increased dosage curve declines, but again ascends. As the drug was withdrawn, nine convulsions were noted in nineteen

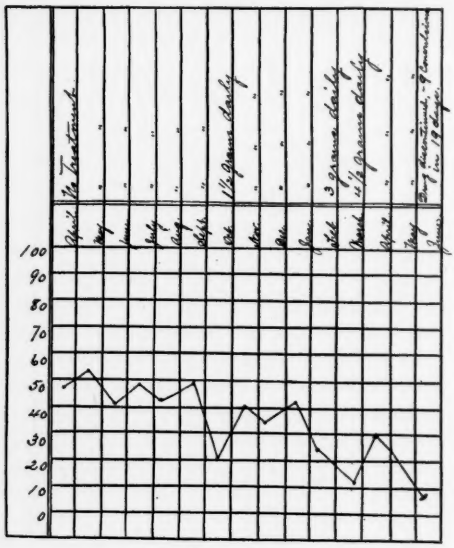

CHART 1.

days, at which time patient became markedly disturbed and further observations were not noted.

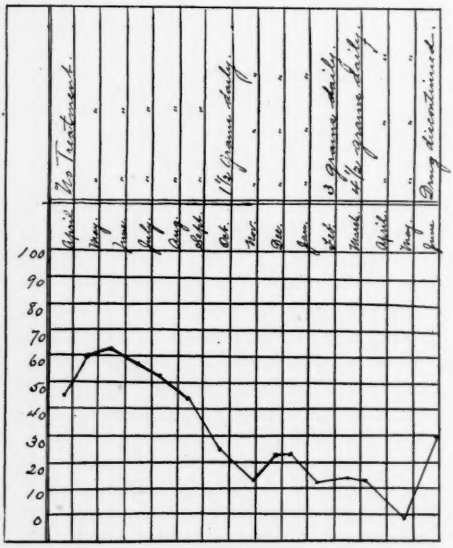

CHART 2.

Chart 2 represents a case with frequent seizures, confusion, and irritability preceding and following attack, and shows a curve prior to treatment, decided decline with the dosage of one and one-half (1½) grains, a secondary elevation and a secondary fall on increased dosage, with marked ascent on the discontinuation of the drug. It is to be noted that the severity and irritability were very much less under luminal treatment.

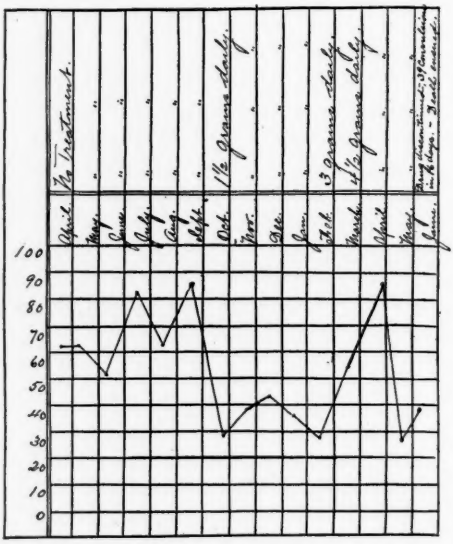

CHART 3.

Chart 3 represents a mild type having frequent seizures, many petit mal in nature. Convulsion curve shows decided decline on one and one-half (1½) grains dosage, secondary elevation, secondary decline with

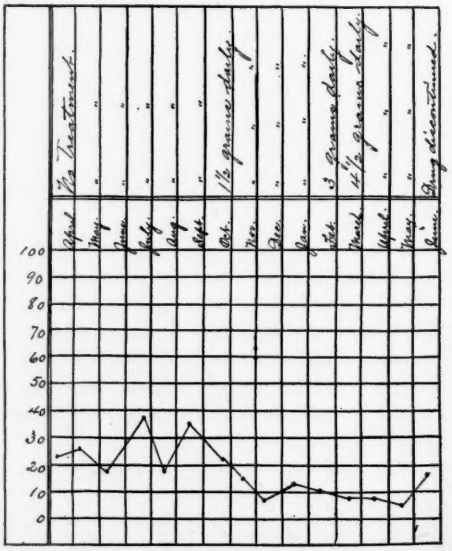

CHART 4.

increased doses, with a marked ascent and descent under the same dosage, and shows elevation on withdrawal of drug, thirty-nine convulsions having occurred in sixteen days. Patient was seized with status epilepticus and died.

Chart 4 represents a case with frequent and severe convulsions, preceded by irritability. Convulsion curve shows decided decline on initial doses, secondary elevation with a fall on increased doses, with a decided elevation on discontinuation of the drug. During treatment seizures not so severe and irritability lessened.

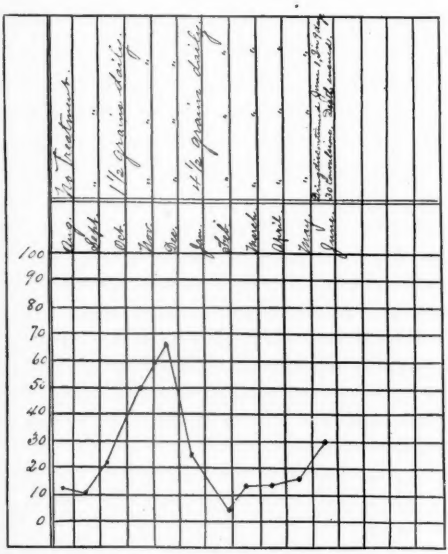

CHART 5.

Chart 5 represents a case of petit mal type, convulsion curve continuing to rise under treatment of one and one-half (1½) grain doses, with a decided decline on four and one-half (4½) grains doses daily, with the usual secondary elevation and marked ascent on discontinuation of the drug. Patient was seized with status epilepticus and death ensued.

Although we have observed only five cases during a period of treatment which extends over a period of several months, we may arrive at the following conclusions:

1. That luminal in doses of one and one-half (1½) grains daily reduces the convulsion curve.

2. After a period of time the drug loses its effect and there is a secondary elevation of the convulsion curve.

3. Increased doses reduce again the convulsion curve, but there is a secondary elevation on increased doses, and a distinct elevation on the complete withdrawal of the drug. This is no doubt due to increased tolerance to drug and the lack of a curative effect.

4. In two of the cases, after withdrawal of the drug, seizures were severe; patients developed status epilepticus and died.

5. Luminal reduces the convulsion curve, but will not completely eliminate the convulsions.

6. Prolonged use of luminal is not free from danger, and withdrawal of the drug should be carried out with greatest care and precaution.

7. The degree of postepileptic confusion and furor was lessened in two cases.

8. Luminal offers temporary relief, but the value of its treatment in the custodial epileptic is doubtful, as established tolerance necessitates higher dosage, the continued use and withdrawal of same being associated with serious phenomena.

The Use of Acetylsalicylic Acid Locally After Tonsillectomy, and in Acute Pharyngitis

BY EDWARD P. HELLER, M.D.

[From the Clinic of Dr. John G. Sheldon, Kansas City, Mo.]

Since 1916 I have had the opportunity of observing the local effect of acetylsalicylic acid in nearly 1000 cases convalescent from tonsillectomy. The fact that its use is almost universally successful in relieving the annoying dysphagia, together with the fact that many of the nose and throat surgeons in Kansas City are employing the drug routinely after tonsillectomy, prompts me to record these few notes relative to its use.

In looking over a number of standard texts I have been unable to find reference to the local use of acetylsalicylic acid for any condition, and its use after tonsillectomy is not referred to in any of the literature to which I have access. I will make this exception to the foregoing statement, viz., in Hare's "Practical Therapeutics" and in Thornton's Pocket Medical Formulary the following prescription is to be found under "Tonsillitis:"

℞ Acidi acetylsalicylici, 4.00.

Sig.: Apply carefully to tonsils with dry cotton swab every 12 hours.

Indications: In rheumatic tonsillitis, the tonsils and nasopharynx should be cleansed with a solution of sodium bicarbonate before each application.

It was to this prescription that I attributed my own relief from dysphagia when, in 1916, I had my own tonsils removed, and for three days had tried every gargle and application in the pharmacy of the hospital in which I was then serving. Being unable to swallow the tablet of acetylsalicylic acid whole, I chewed it up and swallowed it in small pieces. The taste was not very disagreeable and the effect was amazing. I went immediately to the dinner table and ate comfortably for the first time in four days. Thereafter I took 1 to 3 decigrammes of the drug ten or fifteen minutes before each meal and had no further discomfort.

From that day to this I have carried the gospel to those who seem interested in the relief of their patients after tonsillectomy, and can count a number of locally prominent nose and throat surgeons among the converts. Many had known of the local effect of aspirin it is true, but most had not, and none had used it following tonsillectomy.

I must confess that I have never exactly followed Dr. Thornton's directions, but have given the acetylsalicylic acid alone in powdered form, on the tongue, or in water —about 3 decigrammes to one-fourth glass of water, as a gargle. It would appear that the efficacy of the drug is partly due to the mildly acid solution it makes with the saliva. This in turn causes a vasoconstriction and increase in the tonus of the damaged tissue of the pharynx, together with the intrinsic, analgesic effect of most drugs of this group, plus, later, the general systemic effect of acetylsalicylic acid, which is chiefly analgesic.

In vitro the addition of 3 decigrammes of sodium bicarbonate completely reverses the acid reaction of acetylsalicylic acid dissolved in saliva and causes a frothy alkaline mixture to result. In view of this fact and because of the excellent results obtained by administering it alone, I have never ordered a preliminary alkaline gargle, nor have I given an alkali with it to cases convalescing from tonsillectomy. For ordinary pharyngitis and simple acute tonsillitis I have thought at times that a powder of equal parts aspirin and sodium bicarbonate gave considerable relief when taken on the tongue.

Administration.—To patients convalescing from tonsillectomy, it is the practice to administer 1 to 3 decigrammes of the powdered drug on the tongue, on the evening of the first day, or about eight to

ten hours after the operation. They are then given the same dose ten or fifteen minutes before each meal for three to four days. Relief is almost universal, as I have stated—in fact, in the past eighteen months I recall only two patients who did not voluntarily state that they were relieved. Most patients are able to swallow comfortably immediately the powder has passed the oropharynx.

In patients with an idiosyncrasy to the drug, or in whom ingestion of the drug is contraindicated, a weak solution (3 decigrammes to 30 Cc. of water) is given as a gargle, and with practically the same effect as when the drug is swallowed. This fact proves very conclusively that it is not the systemic effect that does the good.

In acute pharyngitis and simple acute tonsillitis, powders of 1 to 3 grains of the drug are prescribed every three or four hours to be taken on the tongue without water. Results are identical with those observed in postoperative tonsillectomies. In all cases the ordinary precautions are followed with respect to position, regulation of diet, and care of the bowels. In rare cases a mild gargle, such as weak Dobell's solution or 25-per-cent glycothymoline, is allowed as a mouth-wash between meals. Gargles are seldom prescribed, nor do they seem necessary.

Mechanical Aspects of Acquired Chronic Valvular Heart Disease*

BY ANDREW P. D'ZMURA, M.D.

Pittsburgh, Pa.

It may be possible that during the course of chronic valvular disease the rôle of the heart muscle is at times overshadowed by certain mechanical factors which result from the disturbance of anatomical relationships. Electrocardiograms of certain individuals with chronic valvular disease (especially in those before the age of forty) may reveal none of the characteristic alterations which are commonly thought to be indicative of gross muscular change, the only finding in many cases being a preponderance of one or other ventricle. Furthermore, autopsy findings in such cases do not always reveal sufficient damage to the myocardium to account for death on that basis alone. The attempt will be made to correlate clinical findings with possible disturbed anatomical relationships.

At the outset it is necessary briefly to consider the relationships of various parts of the heart. It is suspended in the mediastinum largely by two important structures: (*a*) the pretracheal layer of the cervical fascia which descends into the chest, enveloping in its descent the thyroid gland, left innominate vein, the aortic arch, and finally fusing with parietal pericardium both anteriorly and posteriorly; (*b*) the left bronchus, over which the aortic arch is hooked.

The base of the heart is definitely fixed in the transverse position by other mediastinal structures. The left auricle is firmly enclosed in relatively small confines, being bounded posteriorly by the vertebral column, descending aorta, and esophagus, anterosuperiorly by the ascending aorta, pulmonary artery, and the left coronary artery, laterally by the pulmonary veins and hilus of each lung. The left auricular appendage projects anteriorly and to the left; it is in close relation to the pulmonary artery and overlaps the left coronary artery. The right auricle is fixed in the vertical plane by the superior and inferior caval

*From the Department of Medicine, School of Medicine, University of Pittsburgh.

Read before the Section on Medicine, Pennsylvania State Medical Society, Philadelphia, Oct. 5, 1921. Also presented, with illustrative anatomical material, before the Society for Biological Research, School of Medicine, University of Pittsburgh, Oct. 20, 1921.

veins, medially it is bounded by the ascending aorta, laterally it is in relation to the right phrenic nerve.

The ventricles are relatively mobile, being attached both to the auricles and great vessels arising from the base of the heart and bounded laterally by soft lung tissue, the left ventricle occupying the cardiac notch of the left lung. They are bounded anteriorly by the chest wall; enlargement anteriorly is thus limited, and in the presence of marked hypertrophy rotation takes place.

When the ventricles alone are enlarged, very few structural symptoms—*i.e.*, those depending for their production upon disturbed anatomical relationships—are present. On the other hand, when disturbances are present in the auricles, pressure, direct or indirect, may disturb the function of the surrounding structures and give rise to many of the signs and symptoms found in chronic valvular disease.

Disease of Aortic Valve.—Disease of the aortic valve is usually well established before discovery, possibly because the left ventricle may undergo marked hypertrophy without causing pressure signs, as the left lung and chest wall are the only structures pressed upon and the chest wall is avoided by rotation. Aortic valve disease in absence of marked damage to kidneys or other vital organs is a comparatively benign condition. Death by heart failure usually results from the association of mitral disease, fibrillation, or damage in other organs, the same etiological factors being responsible. The first signs of aortic insufficiency may be dyspnea, pallor, violent throbbing in the neck, and attacks of precordial pain on exertion. Dyspnea and pallor may be due to the decreased volume output of left ventricle and the physiological increase of respiration as the result. A diminished blood supply to the respiratory center may be an additional factor in the production of dyspnea.[1] According to Eppinger and Schiller[2] acidosis may be considered an unlikely factor in the absence of renal or other changes. Headache, dizziness, ringing in the ears, throbbing in the neck, and mental symptoms are commonly thought to be due to cerebral anemia.

Pain in Aortic Disease.—It is a well-known clinical truth that pain is much more frequent in aortic than in mitral disease. The greater pain in aortic disease may possibly be due to the fact that both coronary arteries are involved, as they arise from the aortic sinuses which are in close relationship with the aortic valve itself. Pain may be due to the sudden collapse of the coronaries and vessel-wall spasm, or the pain may be due to overdistention of coronaries causing pressure upon the accompanying nerves. The process is considered by some to be the same as met with in any smooth-muscle spasm, *e.g.*, biliary or renal colic, the sympathetic innervation passing reflexly through cord, the visceral fibers forming sinapses in the various parts of the gray matter of each segment.

Dropsy is not found in uncomplicated aortic disease as there is no anatomical reason for its occurrence. When it occurs in absence of cardiac enlargement Mackenzie[1] believes it is probably not of cardiac origin. He also doubts the existence of urinary signs of heart failure in the absence of dilatation: there is no anatomical basis for such manifestations.

Cough, hemoptysis, liver enlargement and general anasarca do not occur except with coincident mitral involvement, which is relative or due to actual damage to the valve. At times the presence of auricular fibrillation with aortic insufficiency may obscure the mitral valve element.

Aortic Stenosis.—When occurring without marked insufficiency this lesion is quite benign. There may be no symptoms for many years. The signs and symptoms commonly considered to be indicative of heart failure are usually due to the presence of other disorders, as the only mechanical influence may be a hypertrophied left ventricle which develops slowly and is not associated with great dilatation unless marked insufficiency also be present. This hypertrophy eventually gives way to extreme dilatation, resulting in relative mitral incompetency with its sequelæ.

When hypertrophy and dilatation of the left ventricle have reached a certain stage in aortic disease it is well known that the left auricle becomes involved. This has been commonly accepted as a classical example of so-called back pressure. As was pointed out previously, the left coronary artery is in very close relationship to the left auricle. It is reasonable to think that pressure is made upon this vessel, which supplies the heart muscle itself. May not the further dilatation and damage of the heart muscle be due directly to this impairment of nutrition? The acceptance of such a factor would do much to clear up the cause of progressive muscular damage, the myocardial changes being secondary to a mechanical condition whose progress cannot be stopped after a certain amount of damage has been done—*i.e.*, after the left ventricle becomes large enough to cause pressure on the left auricle. It is realized that the concomitant valvular and muscular changes may be due to the same etiological factor: nevertheless it is believed that there are many instances in which the muscle changes may be very much aggravated by definite mechanical conditions and that in such cases the rôle of the myocardium is secondary.

Mitral Stenosis.—Patients having mitral stenosis often show a much more varied symptomatology and many more physical signs than patients with uncomplicated aortic disease because involvement of the auricles usually is more extensive and consequently the variations in mechanics from the normal are greater.

In mitral stenosis the left ventricle is small, but the enlargement of the left auricle is one of the principal changes. The musculature of the auricle is comparatively thin: marked hypertrophy does not occur, but dilatation rapidly takes place after increased intra-auricular pressure, and without doubt the mechanical influences overshadow the importance of the heart muscle in many instances. A great many pressure symptoms may be assigned to enlargement of the left auricle.

(*a*) Pressure on left pulmonary veins may produce left-sided pleural effusion.

(*b*) Marked enlargement of left auricle may cause narrowing of the four pulmonary veins, producing bilateral pleural effusion.

(*c*) Mechanical damming back of blood into the pulmonary veins may cause congestion of the lungs and hemoptysis.

(*d*) Pressure on the coronary arteries interferes with the nutrition of heart muscle itself, which explains the more rapid progress of mitral stenosis as compared to mitral insufficiency.

(*e*) Pressure on the accompanying nerves of the left coronary artery, which are derived from the superficial and deep cardiac plexuses, may conceivably give rise to a sense of oppression and vague pain over the precordium and stitch-like pains in the region of the apex.

(*f*) Pressure on the left recurrent laryngeal nerve may cause aphonia.[8]

(*g*) Pressure on bifurcation of trachea may cause brassy cough.

(*h*) Pressure on esophagus may cause dysphagia.

(*i*) Pressure on phrenic nerve may cause hiccough.

General anasarca due to venous engorgement is rare because in mitral stenosis with enlarged left auricle the inferior vena cava is not interfered with. Where, however, a combined lesion is present enlargement of the right ventricle may result from back pressure into the pulmonary arteries and tricuspid insufficiency may develop; dilatation of the right auricle may occur with subsequent damming back of blood into the great veins, with enlargement of the liver, followed by ascites. The enlarged liver precedes the ascites because the hepatic veins situated closer to the heart first become engorged, and the liver becomes the reservoir of heart before there can be any demonstrable ascites.

Where the right ventricle is enlarged there may be mechanical displacement of the left ventricle further to the left, and the right auricle rotates further to the right

at the same time. This may cause constriction of the inferior vena cava at its entrance to the right auricle, with consequent water-logging of the parts drained by this large vessel.

Right-sided pleural effusion may occur in the presence of enlarged right heart owing to the following mechanical factors:

(*a*) Heart is enlarged in the transverse plane with a pulling down of the superior vena cava, which thus constricts the vena azygos major as it loops over the right bronchus.[4]

(*b*) By direct pressure of the right heart on the right lung root and indirectly pinching the vena azygos major, as it curves over the right bronchus to enter the superior vena cava.[5-6]

(*c*) The enlarged right heart may make pressure on the left auricle and the lower right pulmonary vein, which is the most anterior structure of the right lung root.[7-8]

Mitral Insufficiency.—In certain stages of mitral insufficiency the left ventricle is enlarged less than the right ventricle and the size of the left auricle is practically unchanged. This valvular lesion is commonly recognized as having the least unfavorable prognosis. This is possibly due to the fact that mechanical changes are very small in this type. Dyspnea on exertion may be due to the general lack of oxygenation of blood during increased effort, the volume of output at each beat being smaller than normal. May not the increased respiration be a physiological attempt to bring about better aeration? When decompensation occurs the signs and symptoms may well be explained on the basis of back pressure.

Pain is rare in mitral insufficiency unaccompanied by marked stenosis because there may be very little change in the left auricle, and therefore no pressure on the left coronary artery and its accompanying nerves.

Auricular Fibrillation and Mitral Disease.—It is very well known that auricular fibrillation is very commonly found in association with mitral disease. In this disturbance of mechanism the pace-maker does not function. This structure is embedded in the sulcus terminalis, which lies upon the posterolateral surface of the right auricle passing from the superior to the inferior vena cava, and in direct relation to the left auricle and the orifices of both right pulmonary veins. May not the purely mechanical factors of pressure at times have a certain part to play in the production of this disturbance of mechanism?

Value of X-ray Findings.—The foregoing anatomical and clinical considerations appear to be corroborated by fluoroscopic findings in living patients as summarized from the work of Vaquez and Bordet.[9]

According to these investigators the image of the normal heart in the frontal position is as follows: Right ventricle occupies greater part of frontal aspect. It is bounded above and at right by the auriculoventricular groove which separates it from the right auricle, which constitutes the upper two-thirds. On the left the anterior interventricular groove bounds on the outside a narrow band of the left ventricle from the base to the apex. At the base the aorta and pulmonary artery are present. Normally the structures on the right are as follows: In the second interspace, ascending aorta and superior vena cava; in third interspace, right auricle; in fourth interspace, right ventricle. On the left in first interspace, arch of aorta; in second interspace, pulmonary artery, below which is left auricle; in third, fourth and fifth interspaces, the left ventricle.

In aortic incompetency without serious decompensation, fluoroscopic examination shows that the shadow of the heart occupies a somewhat median position and that the apex, which is lowered, is pushed only slightly outward. Contour of the left ventricle is elongated, convex, not exaggerated. Right contour is normal. The longitudinal diameter exceeds the normal and the horizontal diameter is decidedly less. This is the picture without involvement of other cavities. Sometimes the hypertrophy of the left ventricle is very slight. On the contrary, many cases of aortic insufficiency however well compensated are accompanied by considerable

ventricular hypertrophy. As has been stated previously, the combination of aortic insufficiency and mitral stenosis is more serious than the presence of aortic insufficiency alone. The fluoroscope renders valuable assistance in determining whether a mitral lesion is present, as the left auricle is usually normal in aortic insufficiency alone, but is always increased in mitral stenosis of a moderate degree.

In aortic stenosis the fluoroscopic findings are somewhat similar to those in aortic incompetency, and it is to be remembered that if no lesion is present in the aorta there may be no signs of cardiac insufficiency.

Radiograms of mitral insufficiency without any marked circulatory disturbance resemble somewhat the normal horizontal heart. Development is exaggerated on the right. Contour of the left ventricle is normal. The apex is pushed outward, is rather pointed, and not lowered. The transverse enlargement of the heart is due to development of the right cavities. Left ventricle is enlarged less than the right. The left auricle may not appear to be changed. Ventricles are accentuated when mitral insufficiency is complicated, as, for instance, if fibrillation be present, transverse enlargement may be considerable.

In mitral stenosis radiograms show left median aorta plus, especially in the portion corresponding to the left auricle. The left ventricular outline is of slight dimension. The convexity is not so marked as in the normal. The apex takes on a pointed appearance. The right contour is very noticeable beyond right edge of sternum. The inferior vena cava is often more visible than in the normal. In the normal, left outline is greater than right, whereas in slight mitral stenosis the left but slightly exceeds, equals, or is even less than the right outline. Longitudinal diameter is usually exaggerated. Horizontal diameter is always much less than longitudinal. The heart is lowered and at the same time undergoes displacement from right to left, from behind forward, so that the right cavities are slightly raised toward the sternum, and the right curve of the heart must necessarily be raised in the upper part to the level of the large vessels as well as in the diaphragmatic position and shows an exaggerated development outside of the sternum. Thus in mitral stenosis the heart undergoes a slight downward displacement, a movement downward which forces the apex below the normal position, and a seesaw movement which pushes the right auricle to the right without a real enlargement of that cavity. Enlargement of the left auricle is one of the principal changes in mitral stenosis, and the auricular appendage is compressed by the hypertrophied auricle. The lowering of the heart puts tension on the vessels. The outline of the pulmonary artery is more rectilinear. The underdevelopment of the left ventricle makes projection of pulmonary artery and left ventricle more apparent. When the left auricle is dilated or hypertrophied the shadow approaches or merges into that of the vertebral column.

The Value of Electrocardiograms.—Electrocardiograms in the cases under consideration are of value chiefly from a negative standpoint. The assumption of a predominating mechanical influence in the production of decompensation may be more safely made when the tracing shows no evidence of the changes commonly regarded as indicative of gross muscular damage. Variations in heighth and width of the P wave, especially when associated with notching, are considered to be indicative of changes in the auricle. In these cases the electrocardiogram may be practically normal with the exception of preponderance of one ventricle or the other, and a variation of the P wave if mitral disease be present; in our present state of knowledge neither of these changes is regarded as indicating severe myocardial damage. When, however, gross defects, such as branch bundle lesions, are found, it is apparent that the mechanical aspect is secondary in importance.

Aid in Prognosis.—In prognosis we can be very greatly assisted by considering the mechanical aspects along with damage to the myocardium. If evidences of both be present, prognosis is necessarily more seri-

ous. If the patient be suffering, however, from an uncomplicated aortic regurgitation, and if it is found that there is only moderate hypertrophy of the left ventricle, a brighter outlook can be promised. If the lesion is found to be a mitral insufficiency without a marked accompanying stenosis the best prognosis in any of the chronic valvular lesions may be given with considerable assurance. When the late evidences of mechanical pressure are present, as, for instance, edema of the extremities in a patient who is primarily suffering from mitral stenosis, we can be fairly certain that the end is not far removed. The same holds true in cases in which the lesion was primarily aortic insufficiency, as the anatomical explanations show that this sign is found only in advanced cases.

In considering prognosis of chronic valvular lesions it must be remembered, however, that 60 per cent or more of the patients who show the extreme signs of decompensation and irregular pulse have auricular fibrillation, a condition in which during the untreated stage we have a very inefficient mass movement of blood. When the ventricles are slowed many of the signs and symptoms disappear very quickly.

In many instances a patient having mitral stenosis and decompensation without the presence of auricular fibrillation may not respond to treatment nearly so promptly nor so thoroughly as a patient having mitral stenosis and auricular fibrillation. The question naturally arises as to the mechanical differences between fibrillating auricles and those having a sequential diastole and systole. It would be confirmatory of the importance of pressure in the auricular region if it were found that, the rate of the ventricles not being excessive, the auricles during fibrillation have a somewhat smaller volume than during certain phases of the ordinary auricular cycle. So far as known no observations along these lines have been made.

Compensatory Postures.—Patients having considerable enlargements of the various chambers of the heart assume various postures in an attempt to utilize every available bit of intrathoracic space. Some of them are definitely more comfortable in the sitting posture because the abdominal contents are compressed, the diaphragm is pushed up, and the heart assumes a more horizontal angle; some secure additional space by leaning forward on abducted elbows; some choose lying on one side in preference to the other, very often extending the homolateral arm—the head and chest may or may not be elevated at the same time; some find comfort only when prone; some beg to be allowed to stand upright to get a few moments' relief. After a patient has found that he is more comfortable in one position than in another he will maintain it as long as possible.

In patients with protracted courses pressure sores may be seen in unusual regions—for example, over the patellæ: in such instances one is almost positive that mechanical embarrassment overshadows the rôle of the heart muscle during a great part of the terminal stage.

Suggestions for Treatment Based upon Mechanical Considerations.—When the patient's optimum position has been found he will assume it of his own accord while rational and awake, and it will be found that he can fall asleep only in the same position. If delirious or asleep he may alter his position and invariably becomes very much more uncomfortable; therefore delirious and sleeping patients should be maintained in the optimum position by propping them with pillows (due consideration must, however, be given to the possibility of hypostasis of the lungs).

It is believed that many attacks of nocturnal dyspnea, precordial pain, cough, palpitation, etc., are due to a change in position while asleep, especially in those patients who do not have similar complaints during the day.

Patients with a degree of compensation which permits moderate exertion should be instructed to assume their optimum position immediately after any fatiguing effort, as they obtain relief more quickly than if they are left to shift for themselves. By this procedure the intervals of possible mechan-

ical embarrassment to the heart muscle may be distinctly shortened.

My observations on the influence of various postures are naturally far from complete as the possible combinations of mechanical disturbances are very numerous, yet in certain instances it has been possible to make a tentative diagnosis merely by observing the position of the patient or by asking him in which position he found himself (*a*) immediately upon awakening from a refreshing sleep, or (*b*) immediately after being awakened by dyspnea, palpitation, precordial pain, or cough.

COMMENT.

If it be true that in certain patients with chronic valvular heart disease the ultimate outcome depends upon mechanical disturbances which inevitably wear out heart muscle and cause lethal changes in other organs, it would seem reasonable that an attempt should be made to diminish such mechanical disturbances. Cardiac decompression by surgical procedures may possibly be of value when it appears certain that mechanical embarrassment outweighs the rôle of the heart muscle. Does nature provide us with a portion of the heart uncovered by lung as a reserve against increased pressure? Could this reserve be increased by removal of the bony framework over the superficial cardiac area? Does nature deform the chest of a child with chronic valvular heart disease to relieve cardiac pressure, or is the bony framework in its normal condition an additional safeguard? These appear to be definite problems awaiting solution, and the only excuse for mentioning them while my work is in an embryonic state is to enlist the aid of more experienced clinicians and more expert laboratory workers in solving this complex matter.

REFERENCES.

1. Mackenzie: Diseases of the Heart.
2. Eppinger and Schiller: *Archiv für innere Medizin*, Vienna, 1921, ii, No. 3.
3. Norris and Landis: Diseases of the Chest.
4. Baccelli: Quoted in Davis' Applied Anatomy.
5. Steele: *University Medical Magazine*, 1897; *J. A. M. A.*, 1904.
6. Stengel: *University Pennsylvania Medical Bulletin*, 1901.
7. Fetterolf and Landis: *Amer. Jour. Med. Sciences*, 1909.
8. Miller: *Amer. Jour. Anat.*, vii.
9. Vaquez and Bordet: The Heart and the Aorta, 2d Edition, 1918.

The Vitamines and Their Relationship to Health and Disease[1]

How to Determine when Vitamines are Present

BY A. D. EMMETT, PH.D., NUTRITIONAL CHEMIST
Detroit, Mich.

(Continued from November number)

We referred in the preceding article[2] to the three generally recognized types of vitamines as the fat-soluble A, the water-soluble B, and the water-soluble C. At this point it may be well to elaborate further upon the classification of the vitamines in order to avoid undue confusion in subsequent statements.

POSSIBLY FIVE VITAMINES INSTEAD OF THREE.

First, with reference to the fat-soluble A there has been much discussion as to whether both the ophthalmic and the rachitic conditions were brought about from certain dietary deficiencies by a lack of this particular vitamine. Mellanby thought that these diseases had a common etiology, but Hess and more recently McCollum are of the opinion that each of the deficiency dis-

[1]From the Medical Research Department, Parke, Davis & Company.
[2]THERAPEUTIC GAZETTE, November, 1921.

eases is more than probably due in part at least to a specific fat-soluble vitamine—that is, there are two vitamines of this type instead of one, the antiophthalmic and antirachitic.

Second, with reference to water-soluble B vitamine, Williams, Bachman, Eddy and others considered that the vitamine which appears to be essential for the proper multiplication of the yeast cell was the water-soluble B. On the other hand, Emmett and Stockholm published results which indicated that this yeast stimulus was apparently different from the water-soluble B vitamine. Funk and Dubin have recently confirmed these findings, and they have proposed to designate this the water-soluble vitamine D. Furthermore, Emmett and Luros are of the opinion that the water-soluble B proper may in reality include two vitamines, the antineuritic and the water-soluble growth-promoting factors.

In view of these statements, we should consider not only the three vitamines that have been generally recognized, but also bear in mind the *possibility* that there are two or three additional ones. While this broader scope of the subject may be confusing, yet in some instances it may help to clarify certain phrases which pertain to the etiology of some of the deficiency diseases.

VITAMINES IN FOODS.

Now, from what we have previously stated,[8] it would appear that one cannot as yet be sure when a food or food product does or does not contain one or more of the recognized types of vitamines. It does not follow, however, that in consuming the ordinary food products the average family under our normal economic conditions is in any immediate danger of becoming a victim of the classical dietary deficiency diseases, scurvy and beriberi. Except in war and other extreme exigencies these two diseases need not concern us, but as we shall see other pathological conditions may come about.

True, there has been and is a marked tendency on the part of the manufacturer to refine many of the food products to such a degree that the vitamines are either partially or totally removed from the food when it is finally prepared for consumption. This is due, however, in the main to the fact that the public, with little if any conception of actual food values, demands what is pleasing to the eye and palate, and also what can be prepared for the table with the minimum expenditure of time and money. The result is that many foods are extremely deficient in these principles. We should therefore concern ourselves with this unfortunate condition of affairs.

Yet, with the variety of foods that are available for the average American table, it is possible to adjust the selection of the culinary articles so that the vitamines as well as the other nutrients can be adequately supplied to those individuals who are in the average state of health. In this connection it is safe to say that, in the long run, the more nearly a food approaches its natural and fresh state the richer it will be in the vitamine or vitamines that it should contain.

VITAMINES FOR THE SICK.

There is a large group of individuals, however, which is made up of the truly pathological and also of the "border-line" type of patients. The majority of these show definite signs of having either a poor or a perverted appetite and also abnormal digestive and low assimilative powers. As a result, it will always be difficult to maintain a variety of foods that will amply fulfil the nutritional requirements which these cases often demand. In other words, there are many instances where it is fundamentally important that an adequate quantity of vitamines should be supplied in an *available* form, and yet it is equally important that the weakened or sluggish digestive tract of the patients should not be overtaxed from using foods that will disagree with them.

CHEMICAL AND BIOLOGICAL TESTS FOR VITAMINES.

Since it is comparatively easy, from the compilation of data that has been made, to select and prepare foods that contain the

other essential nutritive factors—proteins, fats, carbohydrates, and mineral salts—the question that should then be considered is, How can one determine when a substance contains the vitamines and how can one distinguish the several types? Unfortunately there are no chemical tests which can be relied upon to aid us to advantage in this work. The colorimetric chemical tests that have been suggested for the water-soluble B and C vitamines have proven to be of little or no value.

The uninitiated would naturally think that since chemistry can detect so many things, it would be relatively easy to make at least a qualitative test for these substances. This will undoubtedly come to be true in due time—just as soon perhaps as we begin to learn something definite as to the chemical structure and nature of one of the vitamines. Many forget or do not realize that there is a large number of substances which a chemist is not able to make synthetically, but yet he may prepare them by precipitation, etc., although he does not know their exact chemical composition. Take pepsin, for example: we know that it is an enzyme, that it has certain properties, but still we cannot define it chemically. Except for the biochemical tests as a digestive agent, we cannot distinguish the enzymic property of pepsin from some inert organic meat by-product.

Just so with the vitamines, we are obliged to resort to biologic methods which in this case involve the actual feeding of animals under carefully controlled conditions, and then determine what takes place when the substances are fed. *The practical importance and significance of these tests are so great that every physician, dietician and nurse should be fairly familiar with them, and for this reason the method of procedure and the general symptoms produced in the animals receiving the deficiency diets will be stated:*

TEST FOR FAT-SOLUBLE A VITAMINE.

In testing for the fat-soluble A type of vitamine, the albino rat appears to be the most adaptable animal we have. Preferably very young rats are employed, that is, rats ranging from 25 to 30 days old. They are generally fed a prepared diet that contains all the essential nutritional factors except this particular vitamine. In due course of time, about eight to twelve weeks, the rat begins to show the following signs of deficiency: the rate of growth becomes slower and may even cease entirely, and then be followed by a loss in weight; the coat of hair becomes moist, rough, and wiry, and the skin may show signs of xerosis; at times diarrhea occurs, and if the animal is allowed to continue on this diet the eyes become sensitive to light, and weak, as shown by the tendency to squint and by an excess of tears; later there is an edema around the eyes and the lacrimal glands function poorly. The conjunctiva then becomes involved and gradually appears dull. As time goes on, what seems to be a secondary infection generally sets in and serious results to the sight may occur. This is manifested by pus formation, a protruding of the eye, an involvement of the retina, and even rupture of the eyeball, unless a change is incorporated earlier in the diet.

These are definite symptoms of the lack of this vitamine. If the food or extract containing the missing vitamine is now fed to the rat, when it reaches a condition not too far advanced, there will be an early and fairly rapid recovery to normal. In case the food or extract used in the test is very low or entirely devoid of the fat-soluble vitamine, the ophthalmic condition will grow worse and the animal will become totally blind and later die.

Under these conditions of stress the rat is very susceptible to respiratory infection—that is, the resistance of the animal is lowered, due primarily to a lack of this type of vitamine. Secondarily, due to the atrophy of the lacrimal glands of the eye, there is in turn a retardation of the mechanical flushing of the nasal passages. This permits bacteria to lodge and grow. The result then seems to be a gradual extension of infection into the various passageways—nares, tonsils, and bronchi.

TEST FOR THE ANTIRACHITIC FAT-SOLUBLE VITAMINE.

In this case either the albino rat or young puppies are used. The diet fed is lacking in this vitamine. The effect produced is shown by the retardation of the calcification of the bony structures, which manifests itself as rickets and dental caries. In the first instance, if dogs are employed, the leg bones are soft and gradually bend out of shape and the joints become enlarged; while in the case of rats growth soon ceases, the coat of hair becomes rough, and sections of rib bones show the pathological condition of decalcification. In the second instance the enamel of the teeth gradually deteriorates in dogs; while in rats the teeth become dull, chalky white, and wear off easily. If the diet is corrected before these conditions have gone too far, calcification soon starts and the structures gradually become normal.

TEST FOR THE WATER-SOLUBLE ANTINEURITIC VITAMINE.

The animals employed in making this test are generally pigeons, but sometimes squabs, chicks and chickens are used. Fowl are especially well adapted for making this specific test.

The general syndrome due to a lack of this factor with pigeons is first a decided loss in weight, then a decrease in appetite, followed by a further loss in body weight. Concurrent with these changes, the feathers become ruffled; the skin dries and tends to scale; the bile accumulates in the duct, and later the intestinal tract shows evidences of becoming saturated with bile; the animal appears drowsy and stupid, does not fly or sit on the perch, but stands huddled; the pupil of the eye contracts and the iris appears very prominent; the red blood-cell count is below normal; respiration is labored; and in the late stage of the disease the body temperature becomes subnormal. In some cases the birds have paralysis of the legs; while in about as many other instances the head is drawn back in a very characteristic manner, the legs remain normal, but the toes are drawn up. When the animals develop this latter condition they generally have frequent spasmodic attacks, turning over and over backwards.

Internally, some of the changes that take place are: a lessening of the flow of gastric and pancreatic secretions; an alteration in the endocrine glands with an enlargement of the adrenals and an atrophy of the thymus; an atrophied heart and hydropericardium; the testes and ovaries are atrophied with a tendency toward a lack of spermatogenesis and sterility; the lining of the crop becomes roughened and very irregular compared with that of the normal animal; the intestinal condition indicates in many instances marked congestion; there is generally an accumulation of gas in the intestines; the spleen, pancreas and kidneys are light-colored and anemic; and practically all the adipose tissue or body fat is absorbed.

Some of these changes are the result in part of the effects of inanition from which the birds suffer to a greater or less extent. This, however, is due directly to the lack of the vitamine under consideration, since it has an apparent effect upon the appetite.

Now, when the pigeon reaches the low ebb where, after a period of feeding lasting about 21 to 30 days, it passes into the state when partial paralysis and head retraction are evident, the substance to be tested is given the animal by forced feeding or injected subcutaneously. If the vitamine is present in reasonable amount, the bird will respond to treatment and be able to relax and control its muscular movements in the course of a few hours. Then, if the pigeon is given further treatment and the proper food, it will gradually regain its loss in weight and become normal. This procedure is what is called the "curative" test.

Some prefer the prophylactic test, which consists in feeding pigeons or chickens from the beginning the substance under examination, along with the proper amount of the other essential dietary constituents. Feeding a corresponding group of birds at the same time on a ration that will produce

the pathological condition, and also one on a ration that will produce normal results, it is possible, by comparing the three groups, to draw fairly definite deductions regarding the value of the material under examination. This test requires eight to ten weeks.

TEST FOR THE WATER-SOLUBLE B VITAMINE.

As was stated above, there is some doubt as to whether the water-soluble B vitamine is the same as the antineuritic factor. In making the specific test for the water-soluble B it has been the custom to employ very young albino rats. These animals are either fed a balanced ration, containing the substances to be tested, or they are first given a synthetic ration which is complete excepting for the absence of this vitamine. In the latter case, when the animal shows the usual symptoms resulting from the absence of the vitamine, it is treated with the substance in question, and the succeeding results are then observed and noted as in the case of the pigeon.

The withdrawal of this water-soluble B from an otherwise balanced ration produces results in young albino rats which are very similar in many ways to those brought about in the pigeon, but different in other respects. Thus, the initial loss in weight is not so evident, for in many instances the animal continues to grow for two or three weeks, but somewhat less rapidly than it would on the normal ration. Then there is a gradual decrease in appetite and a cessation of growth, as measured by weight, followed by a further loss in weight and a decline in physical condition.

During this entire time the animal, in marked contrast to the pigeon, does not become drowsy, stupid, and sluggish, but it continues to be very active. The coat of hair often appears moth-eaten and very thin. The eyes, however, remain perfectly normal, whereas with the lack of the fat-soluble vitamine it will be recalled that the eyes are affected in a very definite manner. Further, there is no involvement in respect to decalcification of the bones or teeth. Also, these animals are not nearly so susceptible to respiratory infections as are those on a lack of the fat-soluble factors.

These rats do show, however, some similarity to the pigeons in respect to the polyneuritic condition, for as the rat loses weight and becomes weaker it finally reaches a stage during this asthenic period where it suddenly lacks control of its limbs —a sort of creeping paralysis takes effect. The animal often endeavors to stand and move forward in a given direction. In the attempt, it takes the position of being on stilts, as it were, and then with the head swaying about in all directions it finally falls over with a sort of tetany. In this position the posterior limbs are stretched out rigid while the anterior limbs move about in an apparent effort to hold on to something. Thus the feet and toes of the forelegs seem to be much more under control than those of the hind legs. Pricking the posterior feet with a needle shows that the sensory nerves are still functioning while the motor nerves are not. Occasionally the forefeet become affected, but in the large majority of instances that we have dealt with the attack begins with the left hind leg, and then it gradually involves the right hind one. In this condition the tail is stretched out taut, but yet the rat can move it about, for in an attempt to pull itself ahead with its forefeet the tail serves as a sort of rudder.

In several respects, while in this condition, the rat is again very different from the polyneuritic pigeon. Thus it seems to be highly sensitive and nervous. It tries to be in action and alert, while the bird at the stage where the head is retracted seems to be perfectly helpless and almost unconscious, and when it is in the relaxed state it generally remains quiet, stupid, sluggish, and entirely indifferent to its surroundings. On the other hand, the relaxed bird may go into the spasmodic condition as a result of handling.

Treatment of the sick rat at this stage generally brings about very definite and sharp response, so that in six to ten hours the animal after one treatment of a concen-

trated vitamine B preparation often has full control of itself, will be eating its food, and show very little of the previous symptoms of a lack of muscular control. It soon begins to gain rapidly in weight and gradually returns to the normal condition.

Upon autopsy the pathological rat shows almost identically the same picture as the polyneuritic pigeon. There is one very noticeable difference in that the pigeon shows a distinct accumulation of bile, whereas the rat does not.

In working with young chicks about two to three weeks old, Miss Peacock and I have very recently found that they are easily adaptable to this test if the diet is properly adjusted. In fact, the chicks appear to be much superior in some respects to young rats or squabs. It is possible to work with large numbers from one hatching and eliminate much of the variation that often exists between pigeons, squabs, and rats; and further, the length of the test is shortened very appreciably. The chicks are so sensitive and susceptible to the absence of this vitamine that the prophylactic test is possibly preferable to the curative one.

TEST FOR THE WATER-SOLUBLE C VITAMINE (ANTISCORBUTIC).

While we are interested to only a very minor degree in advanced scurvy, this vitamine has a very definite relation to many conditions which come under the subacute or latent scurvy classification. Therefore it is of interest to know how one must proceed to determine whether or not this nutritive factor is present.

Instead of white rats, pigeons, or chicks, guinea-pigs are employed. The prophylactic test is generally the most satisfactory. The young pigs are first weighed, then divided into three groups, one of which is fed a normal diet, another a deficient diet, and the third group the deficient diet plus the substance to be tested. If a concentrated product is being examined it is preferable to treat the animals with definite amounts of it at regular intervals, rather than to mix it with the food. In this way one can be sure that an actual quantity of the substance has really been consumed. Under definite conditions with respect to body weight, dosage, time, etc., Le Mar considers it is possible to obtain relatively quantitative results.

The syndrome in cases where the guinea-pig develops scurvy begins with a loss of appetite and weight. The coat of hair becomes rough, the animal appears less active, the eyes are sunken, and the pig shows definite signs of sluggishness and asthenia. After a time the joints become so tender that when one presses them, even gently, the pig squeals from pain. If the animal survives for a few weeks the gums recede and often bleed, the teeth become loose, and in some instances they may even fall out. Further, from the work of Zilva and Wells and also Howe the pulp of the teeth shows a decided degeneration.

Upon autopsy there may be evidences of hemorrhages in different parts, but most commonly the knees show first, then the elbows, and in very advanced cases there is marked congestion of the intestines. The adrenal glands are hypertrophied and the testes or ovaries are atrophied. The bony structure becomes so soft at times that it is comparatively easy to pierce it with a sharp instrument. The costochondral joints of the ribs become enlarged and the "rosary" is formed. The kidneys and bladder are often affected, and the urine may become very cloudy. The intestinal tract is generally distended.

On the whole the indications for scurvy are not as clearly defined and differentiated as they are with some of the other tests cited. It is often difficult to make a positive diagnosis as to whether death was due to scurvy or starvation, or other complications. Thus, guinea-pigs when placed upon a scurvy diet soon show definite signs of failure and lowered resistance, so that they become an easy prey to infections of various sorts, especially pneumonia. For this reason it is almost imperative to maintain the temperature of the room at about 80° C.

and avoid any draft, and use every precaution possible.

TEST FOR THE WATER-SOLUBLE VITAMINE D.

In cases where it is desired to determine whether this vitamine is present, it is necessary to employ synthetic media and study the relative rate of growth of the yeast cell or certain types of bacteria. Using a control medium and adding to another lot of this same medium some of the unknown substance in extracted form, one can determine under definite conditions approximately the difference in the amount of growth that has taken place over a period of time. If one can eliminate the toxic or inhibiting factors, the results are almost quantitative. It is necessary to employ the same strain of yeast throughout and to keep the stock cultures in prime condition, otherwise the results may be very misleading. Further, great precautions should be taken to not alter appreciably the hydrogen ion concentration of the medium upon adding the extract.

SUMMARY.

From the foregoing statements as to the methods that need to be employed to determine the presence or absence of any one of the vitamines in a food or food product, it is evident that the procedure is one which calls for more than ordinary precautions. These tests require much time and careful supervision throughout. Comparing them, one with another, it seems that each has its own specific purpose and that in no two cases can one say that the tests are, strictly speaking, duplicates. That is, it would seem that one vitamine cannot replace another, but that all are needed for normal cellular metabolism and health.

[In the next paper we shall discuss the pathology of the animal in relation to similar and related clinical conditions in the infant and adult human, and show wherein the so-called vitamines play an important rôle in the physiologic economy.]

(To be concluded.)

Spinal Puncture in Diagnosis and Treatment.

BASTRON, in the *American Journal of Syphilis* for July, 1921, states that very little of positive value can be said about the curative influence of spinal drainage in neurosyphilis. Dercum claims good results from its employment, while Fordyce says it is valueless. The safest course to pursue at present is to withhold judgment and await further developments. This only applies to spinal drainage as used in the treatemnt of neurosyphilis. There are many other affections of the central nervous system in the treatment of which the withdrawal of cerebrospinal fluid is clearly of value.

In skull wounds Boutier and Logre think that the unilateral vascular disturbances liable to follow injury of the brain may be favorably influenced by spinal puncture. Albert claims that lumbar puncture is indicated in the treatment of concussion of the brain, fracture of the base of the skull, and in all cases of irritation of the cortex with increased secretion. Lerda applied spinal puncture in over one hundred cases of pressure of the brain after war wounds, noting the spontaneous subsidence of brain hernias. Brady employs spinal puncture in suspected cases of meningeal hemorrhage in the new-born. Bambaren advises early lumbar puncture in every case of severe and persisting headache. Mingazini has been employing the procedure in the treatment of what he calls persisting hemicrania, the headache persisting for months or years; a definite cure was realized in 50 per cent of his cases. In three cases observed by Spiller and de Schweinitz removal of spinal fluid had a remarkable effect on swelling of the optic nerve. Musser and Hufford find that lumbar puncture offers a ready aid in controlling the delirium of lobar pneumonia. Lumbar puncture has also been found of value in controlling delirium tremens.

Pike made observations on 25 cases in the Danville State Hospital for the Insane.

Cases of status epilepticus responded promptly to spinal drainage. Epileptic furor or mania showed marked benefit. Complete drainage following apoplectiform convulsions in paretics was followed by a clearing up of the paralysis and a return to the usual mental conditions in twenty-four hours. Complete drainage within a few hours of the stroke in cerebral arteriosclerosis with thrombosis and hemorrhage has been very encouraging; the patient is rendered more comfortable, the blood-pressure is lowered, and life has been prolonged. In manic depressive insanity, with marked clouding of consciousness and psychomotor excitement and intracranial pressure, withdrawal of fluid lessened confusion and decreased excitement. High general arterial pressure was lowered in all cases following complete drainage.

In epidemic encephalitis Barker found lumbar puncture, done for diagnostic reasons, relieved the symptoms so markedly that it was repeated at intervals as a therapeutic measure.

Prophylaxis and Serum Therapy of Yellow Fever.

NOGUCHI, in the *Journal of the American Medical Association* of July 16, 1921, states it is understood that vaccination constitutes only a part of the campaign against yellow fever, and in all localities it has been carried out simultaneously with the anti-stegomyia campaign. Just what part the vaccination plays in checking the further spread of the disease is, therefore, not easily estimated; but one facts stands out, namely, that practically all persons vaccinated escape yellow fever, notwithstanding the opportunities for infection to which both vaccinated and unvaccinated are alike exposed under otherwise identical conditions, as shown by the fact that during the period of ten days following vaccination before the protective effect of the vaccine could have developed, the number of victims of yellow fever among vaccinated and unvaccinated was equally great. Vaccination, which protects the non-immune person from infection, is a valuable weapon in itself, but it does not supplant the method of elimination of yellow fever by the anti-stegomyia campaign.

The transmission of yellow fever from man to guinea-pigs and the isolation of Leptospira icteroides have been repeatedly accomplished by various workers in the course of different epidemics: in Guayaquil by Noguchi (1918); in Merida and Peru by Noguchi and Kligler (1919-1920); in Piura by Gastiaburu (1919); in Vera Cruz by Perez-Grovas (1920) and by Le Blanc (1921).

Anti-icteroides serum reduces the mortality in yellow fever when used on or before the third day of the disease. Of 170 cases, ninety-five have been treated on or before the third day, with thirteen deaths (13.6-per-cent mortality), while the average death-rate of untreated patients during these epidemics has been 56.4 per cent (442 deaths among 783 cases not treated with serum). On the other hand, treatment with serum after the fourth day has no appreciable effect, since there were thirty-nine deaths among seventy-five cases (52-per-cent mortality).

Prophylactic inoculation by means of the injection of 2 Cc. of the killed culture of Leptospira icteroides (containing at least 2,000,000,000 organisms per cubic centimeter) is of definite protective value. Among 3230 persons vaccinated twice, no case of yellow fever developed, while 278 cases occurred among the non-vaccinated (Guatemala, Salvador, Tuxpan), notwithstanding the fact that both groups of individuals were equally exposed to infection. Among 4307 persons receiving only a single inoculation of the vaccine, only five suspicious cases (Salvador) developed.

The protection resulting from vaccination does not become effective until about ten days after the last injection, as shown by the frequent case incidence occurring among the vaccinated population within from one to ten days after they were vaccinated. There were twenty-three such cases among 7537 persons who were vaccinated with the standard vaccine.

Editorial

QUINIDINE SULPHATE IN AURICULAR FIBRILLATION.

Two decades ago the interesting and important pathological condition in the heart known as auricular fibrillation was unknown, but to-day it is regarded as one of the most frequent conditions met with, and is being studied more and more exhaustively by the aid of various instruments of precision which have been perfected during the last few years. Up until very recently the only remedy that has been found of any material value is the standby digitalis, and this has to be given in much larger doses than those which at one time were thought to be the maximum if the best results are to be produced. Furthermore, digitalis has to be given continuously if the symptoms are to be permanently modified.

Possibly because attention was diverted from everything else during the War, the discovery by Wencheback as long ago as 1914 that quinidine, one of the derivatives of cinchona, had a definite action in terminating paroxysms of auricular fibrillation and restoring normal rhythm was overlooked. It has only been within the last two or three years that other investigators have utilized this drug, and it seems to be clearly proved at present that it bids fair to rival digitalis in the treatment of this dangerous cardiac condition, provided compensation is not impaired.

To use the words of Lewis, Drury and others in a paper which they have recently contributed to the *British Medical Journal,* the action of quinidine sulphate upon the feeble auricle is perhaps one of the most remarkable and dramatic that is now known in therapeutics. The characteristic feature of the reaction is an invariable and conspicuous reduction of the rate of the auricle beat, and, in patients in whom treatment is successful, the progressive slowing of the auricular action is marked, the disordered action ceases, and the normal action is restored.

Some of our readers may remember that comparatively recently several papers have appeared, chiefly by Lewis, which have shown that auricular fibrillation is essentially what he calls a circus movement, that it is a circulating wave which in its revolution controls the beating of the auricle and which is repeated at the average of 450 times a minute. In other words, the auricle is no longer controlled by impulses arising at a single point, but by a never-ending wave which passes over and over again through the same muscular channels. Studying the influence of quinidine upon this condition, these investigators, and Hoffman, have shown that this drug reduces the excitability of the auricular muscle, but that the most striking action of quinidine upon the auricle is a lengthening of the refractory period. In other words, that fraction of time in which the wave in traveling leaves the muscle behind it for some time incapable of response. They believe, in other words, that quinidine emphasizes or prolongs this period 50 per cent, or more, delaying the recovery of the tissues so that they do not react to the following contraction wave. Furthermore, either as a result of this or other influences, it slows conduction of the auricle. Because it impairs contractile power it is probably dangerous when the ventricle is weakened by disease.

They found that quinidine is not efficient in all cases of auricular fibrillation of the chronic type, but that it abolishes the condition in about 50 per cent. Even in the remainder there is nevertheless slowing to a very marked degree, the rate falling from 400, 500, or 600 per minute to 200, 250, or even 300 per minute.

They have also made the interesting observation that frequently when the auricle is slowed the ventricular rate is distinctly increased. They believe that this action is due to the fact that the quinidine by a

paralyzing action on the vagi permits the impulses to cross His's bundle more readily and removes the inhibitory effect of some of the fibers of the vagi upon the ventricle, having an action, therefore, closely allied to full doses of atropine.

It is interesting in this connection to note that here we have a drug (quinidine) found most efficacious in auricular fibrillation, the physiological action of which as far as the vagus is concerned is directly opposite from that of digitalis, which heretofore has been considered the best drug, chiefly through its power to diminish, directly or indirectly, the transmission of impulses over the atrio-ventricular septum. It would appear, however, that the manner in which quinidine acts is the more direct and the better of the two, except when the heart muscle is feeble.

In another paper by Drury and Iliescu in the same issue of the *British Medical Journal,* a considerable series of cases is reported in which the use of quinidine sulphate was successful in six but unsuccessful in seven instances. Their studies were so exhaustive that they are to some extent beyond criticism. They took care in instances where digitalis had been administered that sufficient time elapsed for the effects of the digitalis to pass off, and they also gave one or two preliminary doses of three grains of quinidine sulphate by mouth for the purpose of determining whether there was idiosyncrasy on the part of the patient to this drug. They then made electrocardiographic records every two hours, at 10 A.M., 12 noon, 2, 4 and 6 P.M. Although they speak of seven cases in which the quinidine seemed to be unsuccessful, nevertheless they point out that whether the normal mechanism was finally restored or not, the auricular rate was retarded fully 50 per cent even in these.

Incidentally they strongly advise that when the electrocardiograph is employed in studying the action of this drug the lead should be purely thoracic, as they believe this gives a more accurate record of auricular activity. They found that the maximum effect of a dose is obtained about two hours after its administration.

They also determined, as have some other workers in this field, that six or seven grains three times a day are sufficient to insure retardation of the auricular rate, and that it is apparently inadvisable to attempt to drive the auricular rate below 200 per minute.

Those who have studied this interesting cardiac condition will be interested to note that the quinidine sulphate in six of their cases restored a normal rhythm, while in seven other cases which they consider "unsuccessful" there was retardation, but when the drug was withdrawn the auricular fibrillation returned to its former degree.

In this connection attention should be called to two interesting communications in the *British Medical Journal* apropos of the articles by Lewis and others. The first of these is by no less an authority than Sir James Mackenzie, who apparently is not as yet fully convinced that quinidine will do all that is claimed for it, pointing out that many remedies have on their introduction aroused great expectations which have not been fulfilled, and that some that are potent for good have also suffered from indiscriminate use and so have become unjustly discredited. The important point, however, which he wishes to emphasize is, to use his words, that "a drug acting like quinidine is not free from danger," although he does not clearly point out what the specific danger is, but he seems to separate it distinctly from digitalis as to safety.

He further points out that in auricular fibrillation the failure of the auricle to contract properly not rarely results in the formation of clots, and that these clots may remain *in situ* while the auricle is fibrillating only to be dislodged and sent into the general circulation, producing infarcts, if the auricle regains its normal contractility. Indeed, such an accident may occur even without normal contractility being restored.

The second point which we think will interest our readers that is made by Sir James is his reminder, to use his words, that auricular fibrillation of itself is not always a dangerous or even serious condition. Thus he mentions a patient who consulted him at sixty years of age fifteen years ago

with auricular fibrillation. His heart-rate was however between 60 and 70, so he was told not to worry, but to lead a normal life so long as the rate of his pulse was moderate, and that he needed no treatment; and yet this man at seventy-five years of age is alive and well.

There are other cases, of course, in which the rate of the ventricle is rapid, in which digitalis is essential, and the prognosis is not so favorable if the rapidity persists.

The field in which Sir James thinks that quinidine will prove most useful is in those cases that do not respond to either digitalis or strophanthine or strophanthus intravenously.

Before determining that quinidine is as powerful for good as its enthusiastic admirers claim, it is also well to bear in mind the fact that in a great many cases of auricular flutter or fibrillation the condition is not persistent, coming and going, and this may lead to the belief that the quinidine has been efficient when in reality such a change would have occurred naturally.

Last of all, Sir James emphasizes his point, that it is not the auricular fibrillation which is the essential matter, but rather the state of the left ventricle and its ability to maintain an efficient circulation, the abnormal rhythm being but an embarrassment.

The other communication to which we have referred is one by Orr, which does not deal with quinidine, but which reports an instance of embolism in a case of auricular flutter, therefore emphasizing the point to which we have just referred, namely, that clots in the auricle may be dislodged by the restoration of normal auricle contractions.

FLATFOOT AND RHEUMATISM.

Before modern methods of estimating the condition of the blood by the use of the microscope and the hemoglobinometer, a favorite diagnosis for patients who were in ill health was to the effect that they were suffering from anemia. Later the diagnosis of malaria was sometimes made, before we knew how to discover the real cause of this infection, and perhaps to-day the term "influenza" is used when a diagnosis is insisted upon and the condition is obscure. So, too, it not infrequently happens that pains in various portions of the body associated with tendons, muscles, or nerve trunks are given the name of "rheumatism." In some instances, this is a correct diagnosis, in the sense that these pains are due to the deposition in these portions of the body of the educts of impaired metabolic processes, and probably the term "rheumatism" is just as accurate as would be the term lithemia or gout. All too frequently, however, the condition is not one dependent upon perverted metabolism, but results from some fault in ligamentous or bony structure whereby stresses and strains are induced which are the real cause of suffering.

Sciatica is not as common a diagnosis to-day as it used to be, now that pathological conditions in the hip-joint and in the sacroiliac joint are better recognized, and pains in the legs and feet are frequently the result of flatfoot or faulty position of the ankle-joint particularly in persons who, with advancing age, gain greatly in weight and whose bony and ligamentous structures are, therefore, subjected to an amount of strain which they escaped in earlier years.

In other cases pain does not develop, but the feet and ankles become somewhat swollen, developing a true edema which will pit on pressure, or a puffiness which will not pit, somewhat resembling a condition in the horse which the veterinarians call "windgall," which condition leads the physician to suspect some cardiac or renal disturbance, yet a careful examination will fail to reveal any feebleness of the heart or any abnormality in the urine. Upon the patient reducing weight, or upon the use of properly made shoes or supports for the parts which are under strain, the puffiness to which we have referred disappears.

It is noteworthy that in all the cases which we have described most of the remedies employed, which are intended for a rheumatic or gouty diathesis, utterly fail, although the salicylates may for a time

seem to be successful in that they tend to relieve pain, and this temporary success often still further misleads the physician as to his diagnosis.

It is not to be forgotten, on the other hand, that some persons who have flatfoot or a turned ankle suffer from no pain whatever, and again there is a third class in which these weaknesses or deformities are present and are entirely free from pain at times and then suffer from severe attacks of it, because in these patients a combination of stress and strain with a gouty diathesis results in the strained parts suffering from both stress and gouty deposit. In such cases adequate support to correct the weakness or deformity, regulation of the diet, and the employment of the salicylates or other drugs belonging to this class, prove successful.

A HITHERTO OVERLOOKED FUNCTION OF THE GALL-BLADDER.

We think that the great majority of physicians have not given any thought to the function of the gall-bladder when it is in a condition of health, considering it simply as a reservoir in which the bile is secreted and from which it is expelled into the small intestine when its presence is necessary in the processes of digestion. It has nevertheless been manifest for many years that we have had far too little information concerning its activity. Many have not known that it ejects the bile in spurts rather than by a constant flow, and now we have called to our attention an important research by Rous and McMaster, which proves pretty conclusively that after the bile enters this reservoir the walls of the gall-bladder take up from it much of its moisture, or, in other words, that a concentration process is carried on which, to some extent of course, depends for its thoroughness upon the length of time which bile remains in this viscus.

Aside from any interest which this fact may possess from the physiological standpoint, it is also of interest because it may lead to a better conception of pathological conditions in the mucous membrane of the gall-bladder which result in changes in the character of the bile as a digestive agent, and also because this process of concentration may have more to do, than appears at first thought, with the formation of gall-stones. It is also of importance because it once more emphasizes a fact too frequently overlooked by medical men, namely, that there are few organs of the body which ought to be removed, although there are a number that can be removed without immediate disaster to the patient and sometimes without remote evil effects. As Rous and McMaster well say, there appears to be little general realization of the physiological uses of the healthy gall-bladder, which has now become a favorite surgical trophy, and then proceed to quote not only the results of their own investigations but those of a number of others. Thus they point out that an intermittent discharge of the bile takes place into the duodenum during the passage of chyme from the stomach, but then ceases, and that this having occurred an ejection of bile takes place only very occasionally until food is taken again. Further, that this bile is definitely bladder bile, that is bile which is undergoing concentration, whereas after the gall-bladder has been removed by the surgeon, the bile dribbles continuously, and during fasting may fill the duodenum and be passed freely in the stools, a condition which is diametrically opposite to that which occurs physiologically. It has also been found that under these circumstances the bile passages undergo a general dilatation, and a condition of biliary incontinence is established. It, therefore, appears that by the process of concentration, to which we have referred, the bile which is ejected into the duodenum when food is passed out of the stomach is a concentrated bile, or one which is capable of being much more active in its function than dilute bile which is continually flowing. As Rous and McMaster well say, the fact that few ills follow upon the removal of the gall-bladder in many cases really means

that the body has adapted itself to the loss. It does not prove that the loss is unimportant.

In another contribution entitled "Physiological Causes for the Varied Character of Stasis Bile," which appears in the same issue of the *Journal of Experimental Medicine,* these authors ask the question, how do these facts, along with others which they present, bear on the present vogue of cholecystectomy; and while they do not seem to answer this question directly, nevertheless the results of their experiments indicate that the gall-bladder has a very definite function to perform, and therefore cannot be removed with the same impunity as the appendix.

It is interesting in this connection to note that the dilatation of the ducts in cases of cholecystectomy, to which we have already referred, may be considered as an effort on the part of nature to provide a substitute reservoir for bile, and this attempt succeeds provided the sphincter of Oddi does not give way. Indeed in some cases it would appear that this sphincter undergoes hypertrophy and becomes correspondingly adequate.

As we have already said, these researches have a definite bearing upon stone formation, and Rous and McMaster believe that measures directed against undue concentration of bile by the gall-bladder should be borne in mind, as, for example, frequent feeding, since by this means the gall-bladder will be stimulated to expel its contents often rather than at long intervals.

It is apparent, therefore, that these two papers should be carefully studied not only by medical men, but also by surgeons, in order that they may have a clearer conception of the function of an organ which both in health and disease is of no little importance.

Last of all, we may express regret that the research referred to did not extend to the study of the influence of certain drugs upon the activity of the gall-bladder. It has long been known that all experiments upon animals and man, heretofore, have apparently shown that calomel and other drugs which are supposed to increase the flow of bile do not seem to do so in the presence of a biliary fistula; whereas clinical evidence seems to be quite clear in regard to this point. The question naturally arises at this time as to whether calomel and blue mass, and other drugs which have a cognate influence, cause the liver cells to secrete more bile or cause the gall-bladder to eject it more freely into the intestine. As most cases of biliousness are apparently due to a lack of bile in the duodenum, it is entirely possible that hepatic torpor, so-called, is not the actual cause of these symptoms, but that gall-bladder torpor is responsible and that the calomel causes the gall-bladder to eject its contents, thereby producing relief. Indeed, we are familiar with one case in which in the course of bilious headache the patient has repeatedly noticed that some hours after calomel is taken he has a sensation in the region of the gall-bladder which he describes as a "feeling as if a key was turned in a lock," and from that moment his symptoms begin to rapidly disappear. Possibly this sensation represents a powerful ejection of bile into the intestine.

THE RELATION BETWEEN CHILLING OF THE SURFACE AND NASAL AND POSTNASAL DISORDERS.

If there is one thing firmly fixed in the minds of the profession and the laity, it is that chilling of the cutaneous surface is prone to produce what is known as a "cold in the head" or a nasopharyngitis, and yet, heretofore, there has been little knowledge which would seem to place such an opinion upon a scientific basis. Since we have had a more accurate knowledge of the relationship of microörganisms to the causes of disease, it has been said that cold lowers the vitality and so permits the microorganisms to multiply and infect, but it apparently has been left to Mudd, Goldman

and Grant to show why it is that infections of the nasal and postnasal mucous membranes so commonly follow chilling of the surface of the body.

By means of ingenious forms of apparatus, specially devised for their research, whereby sudden changes in local temperature could be readily observed, and carrying out their experiments upon human beings, they have reached results which throw a great deal of light upon this subject.

This is not the place to describe in detail the type of apparatus which they employed, but apparently there can be no doubt of the accuracy of their observations, since every precaution was taken to eliminate the effects of trauma and to use instruments which would be accurate. Precautions were also taken as to the temperature of the air inhaled and as to the rapidity and depth of respiration.

The subjects of the experiments were superficially chilled by an electric fan or by exposing the surface of the body to the temperature of the air of the room. It is interesting to note that they found that the chilling of the body surface without exception caused depression of the temperature of the nasal mucous membrane, and they tell us in the *Journal of Experimental Medicine* for July, 1921, that in some instances this amounted to as much as 6° C., a drop which is scarcely credible. This drop was chiefly if not entirely due to an intense vasoconstriction and consequent diminution of blood supply.

When the subject of the experiment was properly covered with clothing a partial recovery of blood supply promptly recurred, although in 10 out of 12 experiments the recovery was incomplete during the period of observation. While a fall of 6° C. has occurred, a typical fall averaged between 1° C. and 2° C. when chilling of the body surface took place.

It would appear, therefore, that these experiments confirm the theoretical deductions heretofore advanced, namely, that chilling of the surface renders these parts liable to infection, but it is interesting to note that the process is apparently the reverse of that which has heretofore been considered present, since heretofore it has been thought that chilling of the surface produced intense congestion of the nasal mucous membrane and that of the nasopharynx, and that this induced the so-called "cold." It would now appear that an intense ischemia is produced, and that the absence of blood in the parts permits infection, the congestion and hyperemia, which is usually considered the earliest manifestation of a cold, being in reality secondary and possibly due to an effort on the part of the body to flood these parts with blood in the hope of providing a sufficient number of leucocytes to overcome the invading microörganisms.

So far as the therapeutic bearing of this research is concerned, it would appear that under certain circumstances the application of astringent substances to the nasal mucous membrane in the presence of infection may actually increase the danger of further infection, since by driving blood from the part the leucocytes are not allowed to remain to carry on their protective processes.

ABDOMINAL TUBERCULOSIS IN CHILDREN.

It is the commonly accepted belief that abdominal tuberculosis in children is usually of bovine origin, the bacillus being carried by milk or milk products, such as butter, cheese, and ice cream. Apparently the infection may gain entrance through the unbroken mucosa, the cecum, and lower portion of the ileum, and thereafter the mesenteric glands, and at times the whole peritoneum.

Ladd *(Boston Medical and Surgical Journal,* Sept. 15, 1921) states, in contradiction to the generally accepted view, that the condition is as frequent in the first year of life as at any age up to twelve years. He further observes that the plastic type—*i. e.,* that in which there is no fluid, but in which the coils of intestines are adherent to one another and to the parietal peritoneum—

does not represent a curative effort, since a fatal termination is a common result even with no other lesions in the body.

He alludes to the difficulty of diagnosis and observes that although the disease is by nature more or less chronic, the symptoms for which these children seek relief are in most cases acute and recurrent. Recurrence of moderately acute symptoms of short duration is perhaps the most uniform feature.

Where the infection is confined to the mesenteric glands of the lower ileum and cecum and these break down, to differentiate from an appendix abscess is frequently impossible. The symptoms are acute, vomiting has taken place, there is tenderness over the appendix region associated with involuntary muscle spasm and rigidity. The temperature is between 100° F. and 102° F. Under such circumstances time is usually not taken to ascertain the result of a Von Pirquet reaction and the white count may be only suggestive. When the glands are less broken down but still large enough to be readily palpable, and with less tenderness than one would expect from an appendicitis and more mobility of the mass, a correct diagnosis may be made; but simple hyperplasia of the mesenteric glands must be remembered in the differential diagnosis. Again, where the glands involved are those of the mesentery of the ileum, further removed from the ileocecal junction, a mass may develop in the midline just below the umbilicus which may be differentiated from an appendix abscess by its feel, mobility, and position. When time is taken for a Von Pirquet reaction, it is a great aid to diagnosis, a negative reaction with reliable tuberculin, practically ruling out tuberculosis except in children who have an overwhelming infection. The only cases of abdominal tuberculosis with a negative Von Pirquet reaction have been in infants having in the abdomen large tubercular masses and the peritoneal cavity practically obliterated by adhesions.

The ascitic stage of the disease offers fewer difficulties in diagnosis. The symptoms simulate less closely other diseases. The feature usually noticed is the gradually increasing size of the abdomen. Ascites from other causes is perhaps more rare in the child than in the adult, and one should be able to demonstrate its cause. Rare conditions, such as large ovarian, mesenteric or omental cysts, must be considered and are sometimes difficult to differentiate. Ladd has had five such cases referred to him with the diagnosis of tuberculous peritonitis, some of which have been correctly diagnosed as cystic only after the child was etherized before operation. Signs of abdominal fluid, with small palpable masses of mesenteric glands, associated with a positive Von Pirquet, lack of extreme muscular rigidity, and symptoms of a diffuse septic peritonitis, make the diagnosis of tuberculous peritonitis possible.

Patients suffering from the plastic stage of the disease may have a comparatively long story of digestive disturbances, being below par and not gaining in weight. They also usually have a story of recurrent attacks of abdominal pain, and come to the surgeon only when these attacks become severe or are associated with vomiting and the other signs of obstruction, or possibly when a fecal fistula develops at the umbilicus. As we see patients in this stage not only are they more acutely sick than those in the other stages, but also, in their poor development and emaciation, show more evidence of the chronic malady from which they are suffering. Among plastic cases, five suffered from complete obstruction, two had perforation with septic peritonitis superimposed on its tubercular lesion, two had fistulæ, and one had mesenteric thrombosis with gangrene of a foot or more of ileum.

History of the treatment of these forms of tuberculosis is interesting. They were first practically all considered hopeless. Then there was a time when surgery was resorted to for most of the cases with some gratifying results. Later it was found that surgery was by no means a cure-all and that many patients recovered as the result of outdoor life, proper hygiene, rest, and a nourishing diet. The pendulum then swung

back too far the other way and surgery was omitted almost entirely. To-day, one will find varying points of view. There is sufficient evidence at hand to warrant establishment of more uniformity of treatment than at present exists.

First in importance should be placed proper hygiene, diet according to digestive ability of patient, and outdoor life. Any treatment disregarding these principles is unsound. Surgery as an aid to treatment in selected cases is of unquestioned value, but the case should be logically selected as far as the difficulties of diagnosis make that possible. Kerley advocates operating only when the amount of fluid is sufficient to interfere with respiration, or the heart, or when obstruction is imminent. This teaching does not seem to be based on either the pathological course of the disease or practical results. As Kerley himself states, the diseased glands may at any time be the starting place for localized or general tuberculosis and probably responsible for a considerable portion of the cases of tuberculous peritonitis. Therefore, when one can make a diagnosis of localized tuberculous mesenteric adenitis, the logical procedure is to remove the infected glands. Likewise, when one finds localized caseous glands on an erroneous diagnosis of appendicitis, they should be removed. As a practical matter this has been done many times with gratifying results, both immediate and lasting. There are a considerable number of such cases reported in literature with good immediate results, and eight of the writer's own cases followed from one to eight years have remained apparently well. With this procedure there has been no immediate mortality, but of course it must be understood that the number of cases for which it is suitable is limited; and no one would advocate attempting to remove widely disseminated mesenteric tuberculous glands. Even in such cases, however, it is logical, when there are only a few that show a tendency to break into the peritoneal cavity, to prevent this by their removal, and by so much reduce the chance of a peritonitis or general tuberculosis.

With regard to the large simple tuberculous mesenteric abscesses, it is proper to incise them, evacuate the pus, wipe out the cavity with iodine, and close the incision in the mesentery as well as the abdomen without drainage. Three patients thus treated have been followed over four years and all appear well. Two other similar cases were treated by drainage; one died and one is improved, but has some digestive disturbance and a ventral hernia.

In the ascitic stage of the disease the merits of surgical interference or the reasons for resorting to it are not so clear. Many patients, however, who are not improved before laparotomy turn the corner and start to improve soon after and go on to ultimate recovery. When laparotomy is beneficial to such cases it is probably due to the hyperemia produced by the evacuation of the fluid and letting air into the peritoneal cavity. That this takes place has been proved experimentally. Dr. Mixter has advocated the injection of air or nitrogen into the peritoneal cavity to replace the fluid. Just what the effects of this procedure are has not been demonstrated experimentally, and the practical results have not been striking enough to justify substituting it for the simpler procedure. Nineteen patients with tuberculous ascites have been followed for periods of from three to twelve years. Of four who had no operative interference, three are apparently well and one dead. Eight had laparotomies with the injection of either air or nitrogen. Six of these patients are apparently well and two are dead. Of seven patients who were subjected to simple laparotomy with the evacuation of fluid, six are apparently well and the seventh has a tuberculous keratitis, but otherwise is improved.

Ladd states that at the Children's Hospital there have been twenty-three cases of the plastic stage. Seven of these who had no operation are all dead. On three an anastomosis was performed to try and relieve obstruction. Two of these patients died before leaving the hospital, and the third was temporarily relieved but died five months later. Of the remaining thirteen

who had exploratory laparotomies performed, eight are dead, one is somewhat improved, and four are apparently well. In this stage of the disease the fact that no cases recovered which were not operated on and a few recovered who were, does not lead the writer to the conclusion that the operation was the cause of the recovery or that it was beneficial to the patient in any way, except as establishing a diagnosis and causing proper hygienic treatment to be carried out. That gaining entrance to an extremely small portion of the peritoneal cavity through an incision in the abdominal wall can cure extensive plastic peritonitis is not logical. On the other hand it is difficult to see a child die from obstruction without attempting to relieve it, and surgeons will probably continue to perform many unsuccessful operations for this condition with an occasional gratifying one until it becomes possible to avoid the condition existing.

CONCERNING CATARACT.

Impairment of vision, steadily progressing until it reaches the entirely crippling stage, in those otherwise sound of body and alert in mind, caused by lens opacity, is an affliction popularly regarded as an almost normal manifestation of advancing age. Because of the number of people thus afflicted, and because of the dread of operation, victims of cataract for all time have been susceptible to the promises of charlatans, whose "cures" or preventive applications and medications have been widely and futilely used.

Sattler *(Ohio State Medical Journal,* August, 1921) states that a long absurdly tolerated terminology designating cataract as immature, mature, or hypermature is misleading and at variance with existing textural alterations and clinical facts, as will be abundantly and conclusively upheld by examination by transillumination and transmission of light.

The transformation which is slowly and inexorably taking place, from partial to general loss of a former transparency in the lenses of an aged person, is the very opposite of an exuberant nutritional activity of the vascular and lymph channels or approaching or accomplished growth or maturity of an organ or living structure, but is, as commonly accepted, a senile nutritional aberration, akin to cell or lens band extinction, desiccation of the connecting cement substance from defective water or lymph absorption, loss of elasticity or a variable degree of hardening or sclerosis, and, less frequently, a softening or solution of a former textural firmness of the anterior and deeper layers of the lens body substance, often even with reduction to a liquid, milky fluid, with the remaining harder central portion or nucleus a free or floating mass.

The following conclusion embraces the united confirmed opinions that, as in the past, every progressive and experienced ophthalmic surgeon will continue to extract, in the present and in the future, cataractous lenses which are only partially opaque, or those in which the clouding is not general, if this condition spells ocular infirmity with the impossibility of continuing wonted activities for his patient. He will select the safest means of lens delivery which present-day surgical standards uphold as most approved, irrespective of method. He will be guided only by a safe and sober general intelligence and will direct his own course in support of the foremost modern conclusions of this important subject which represents, in name and in fact, a modern truth to every one who has the mutual interest of humanity and surgery at heart and hand.

Every case of senile cataract with commonly accepted surgical risks is operable. It is not the textural alterations of a partial or more or less general opacity of the lens which decides the question of an immediate or deferred operation for its extraction, but the degree of helplessness or the ocular infirmity of an individual which is thereby induced.

The most valuable present-day conclusions as to the surgical treatment of senile cataract center around the now generally

accepted feasibility of lens extraction in its unbroken capsule.

Surgery and humanity alike are indebted to Lt.-Col. Henry Smith for his signal discovery, which parallels, in originality and importance, the cardinal features of extra-capsular delivery, the original or first method of extraction, and the supreme discovery of Daviel's genius.

It has with many and will soon become the resolute aim of every progressive ophthalmic surgeon to adopt or combine this new means of lens expulsion in its intact capsule, with due appreciation of its limitations, but with even fuller consideration of essential present-day surgical facts, whether he selects the Smith-Indian method as such, or any other modernized classical one, if a thorough general and special surgical training, deftness of hand, perfect vision and resolute judgment on his part can be counted upon.

In judging the physical characters of an opaque lens, with every diagnostic means at our disposal before an operation, which has for its purpose either an extra- or intra-capsular extraction, we can safely be governed by two generally accepted facts: That cataractous lenses for which senility is the main cause in evidence can be placed in two groups. The smaller one includes the large flat, uniformly sclerosed or desiccated lenses, dense in color, approaching amber or blackness, with sharp and hard equatorial borders, and especially common among individuals of advanced age; these do not lend themselves to a ready expulsion in capsule for the inexperienced, and have been for most surgeons the stumbling-block or the cause of absolute failure. If, however, selection be made from the larger or more numerous group, among which the lenses show a lighter color, but always with slight or greater tumefaction of lens substance and nucleus and rounding rather than angularity of the equatorial region, usually with presence of translucent areas, as objective examination can in most cases conclusively establish, their purposive selection for an intra-capsular expulsion will be rewarded with successful and facile delivery unless uncommon happenings take place.

If expulsion succeeds by the Smith-Indian method, without uncommon complications, it is a first and final success. It completely prevents the escape or retention of lens and capsule tissue, it also eliminates prolonged and painful healing, and as certainly the ever deplorable postoperative consequences. It also insures an equal or large proportion of uniform, painless recoveries, with more nearly approaching perfect or satisfactory results to patient and surgeon.

If an extra-capsular delivery and its capsular opening—no matter how spacious—is made part of the technique of a modernized method of an older or classic method of lens extraction, we can never be certain that it has been completely emptied of its contents. Often, in spite of the best illumination and clear operative field, the clearest vision of an experienced and deft operator, he will be unable to prevent with certainty the incarceration of wedged-in semitranslucent or of softer brittle and insoluble scales of lens corticalis.

These retained masses, now equivalent to foreign bodies, and the physicochemical changes they induce through liberation of lens proteins, by their so often destructive consequences, often mar or reduce our otherwise partial or complete successes, which, however, compare as favorably, so far as visual results are concerned, and from a surgical view-point even more so, with similar ones of the intra-capsular method of lens expulsion.

Progress in Therapeutics

Medical Therapeutics

Radium in the Treatment of Keloids.

HARRISON, in the *Medical Review of Reviews* for July, 1921, states that a burn is the most common cause for keloid development, and in his series twelve of the cases were due to ordinary burns from fire and two from acid burns. Some of the former have been very extensive, requiring long treatment and observation over a period of years in order to secure the best cosmetic result. One of the most interesting cases was that of a young woman, thirty-two years of age, who had sustained a severe burn of both hands and forearms as a result of a gasoline explosion. There was extensive keloid growth on the extensor surfaces, and the parts were so bound down that the wrist and fingers were fixed, more especially on the left hand. *X*-ray treatment had been given without any benefit. Radium treatment was begun in November, 1914, the left hand only being treated at first. By January the growth was much reduced, particularly on the back of the hand and wrist, and by the end of February the wrist could be moved quite freely. She was very irregular in reporting for treatment, but eventually the keloid tissue was all reduced and an almost perfect restoration of the normal mobility obtained.

Owing to the presence of smallpox in Ontario during recent years more vaccination has been carried out than had been the case for some years previously. In some cases the reaction was quite severe, producing extensive sloughing and ulceration, which, in healing, occasionally became keloidal. Radium treatment has been carried out for the removal of the keloid, where it is disfiguring, with very satisfactory results.

The experience with forty cases has convinced the writer that radium can remove keloid growth in all cases. Naturally in some a better cosmetic result is obtained than in others. It must not be understood that a perfectly normal skin is left when the keloid is removed. Scar tissue is still present, varying in color and texture from the normal. But it is claimed that no other method of treatment so far devised presents the same ease of application and sure clinical results as are obtained by the use of radium.

The Treatment of Placenta Prævia.

THOMPSON, in the *Johns Hopkins Hospital Bulletin* for July, 1921, states that during the past few years a rapidly growing mass of literature has accumulated which advocates the adoption of more radical methods in the treatment of placenta prævia. Particularly since the appearance of King's article upon the subject the employment of Cæsarian section has been recommended as the safest and most conservative method of treating selected cases of this serious complication of pregnancy and labor, and certain writers have even gone so far as to advocate its routine employment.

For the past decade, at least, Williams and his associates have maintained and put in practice the belief that except in rare instances conservative measures give better results so far as the mother is concerned than more radical operative interference. In order to determine whether the results obtained justify such a belief, Thompson has gone over the first 10,000 admissions to the obstetrical ward of the Johns Hopkins Hospital and has analyzed the cases of placenta prævia included therein.

Of fifteen cases in which delivery was

effected after manual dilatation of the cervix, the following may be said: In the early years of the service *accouchement forcé* was the routine method of delivery whenever the cervix was not sufficiently dilated to permit prompt termination of labor by the ordinary obstetrical procedures. In such circumstances the cervix was dilated manually by Harris's method, after which delivery was effected by version and extraction, with the exception of a single case in which the existence of a primary breech presentation made version unnecessary.

In this group he had to deal with the following varieties of placenta prævia: 6 centralis, 4 partialis, and 5 marginalis; and two mothers and eleven children were lost. In one of the fatal cases the patient was moribund on admission, and would probably have died irrespective of the method of treatment, so that her death can scarcely be attributed to the means by which delivery was effected. On the other hand, the other death was directly attributable to the operation. In this instance, which was reported to the American Gynecological Society by Williams in 1906, the markedly exsanguinated multiparous patient was admitted with complete placenta prævia and the cervix somewhat less than half dilated. While Williams was examining her profuse hemorrhage occurred, and the cervix seemed so soft that he felt that it could readily be dilated. Manual dilatation was effected with the greatest ease, the child turned and extracted, and the placenta expressed. The cervix was then inspected, and a deep tear extending to the fornix was discovered on the left side. This was exposed and apparently satisfactorily repaired, the patient being put to bed in good condition. Without further external bleeding she soon began to do badly and died four hours later.

At autopsy it was found that the tear had involved the lower uterine segment, and that only its lower portion had been repaired by the vaginal sutures, with the result that the bleeding had continued between the folds of the left broad ligament and had led to the formation of a hematoma 15 to 18 cm. in diameter.

Although members of the staff had long realized that manual dilatation of the cervix in placenta prævia was usually accomplished at the expense of deep cervical tears, which frequently required immediate repair, the fatality just described still more forcibly accentuated the dangers of the procedure, and led to its abandonment as a routine practice, together with the recognition that generally speaking it represents the most dangerous method of treating this complication.

Following the recognition of the danger of *accouchement forcé,* the use of the rubber balloon has in recent years become the routine method of treating placenta prævia except when the cervix is fully dilated when the patient is admitted to the service. Prior to the world war the reënforced Champetier de Ribes balloon was employed with the greatest satisfaction, but since that time he has been forced to use Vorhees's bags instead. These are of domestic manufacture, and leave a great deal to be desired, in that they are less efficient as dilating wedges, and are distinctly less durable.

Balloons have been employed in 37 cases. In the series the following types of placenta prævia were noted: 6 centralis, 17 partialis, and 14 marginalis. All of these patients recovered.

Ordinarily the balloon is introduced into the uterus after rupturing the membranes, or after perforating the placenta in centralis cases, in preference to the extraovular method advocated by Kosmak and others, because it has been felt that better results are obtained by compressing the placenta against the area of separation. Where haste was essential, traction was made upon the bag by means of a weight attached to the end of the tube and allowed to hang over the foot of the bed. Usually the largest-sized bag was allowed to remain in place until it was expelled spontaneously, after which the course pursued varied according to circumstances. If the bleeding had ceased, and the patient was in good condition, spontaneous delivery was awaited, and occurred in 10 of the 36 cases. On the other hand, if the bleeding continued, or if the

patient was in poor condition, or if the uterine contractions appeared inefficient, delivery was effected by the most conservative means available; the records show that version and extraction were employed in 18, breech extraction in 5, and forceps in 3 cases.

More particularly, since Thompson has been compelled to employ Voorhees's bags, complete dilatation of the cervix was not always effected, so that in five instances it was necessary to complete the process by manual methods. These, however, are not comparable with the *accouchement forcé* which was formerly employed, since as the major part of the dilatation had already been effected by the balloon, all that is required is to overcome the final resistance. Such secondary manual dilatation was required three times on account of premature and repeated rupture of the balloon, and twice on account of tetanic uterine contractions, or because the patient's condition was so serious that it was felt that she could not survive a longer delay.

As has already been indicated, all of the 36 patients in this series recovered, and such a result is the more remarkable, as they were not treated by a single individual possessing unusual dexterity and judgment, but by a succession of resident obstetricians who naturally varied considerably in ability. With such maternal results it can justly be claimed that treatment by means of the balloon is eminently satisfactory, and accordingly one can readily understand why the employment of Cæsarian section has found so little favor in this service.

Of course, it must be admitted that the latter affords a ready method of coping with the situation, and does not require the hours of waiting incident to more conservative methods of treatment. On the other hand, it must be borne in mind that many of the patients who are admitted exsanguinated, and after having been subjected to vaginal manipulations by physicians with imperfect technique, are poor surgical risks, so that the mortality following Cæsarian section in them must inevitably exceed that noted in our service. Furthermore, it should be remembered that the uterine cicatrix following Cæsarian section represents a *locus minoris resistentiæ,* so that the possibility of its rupture in subsequent pregnancies constitutes a danger, which certain writers consider so great as to justify the dictum "once a Cæsarian always a Cæsarian." Consequently, if a Cæsarian is done, it may condemn the patient to repeated sections in any future pregnancies. If this is the case, the unprejudiced observer must admit that it is a questionable procedure so to treat the ordinary case of placenta previa that this will be necessary, more particularly as other methods of treatment are available, which give as good or even better immediate results and do not compromise the future child-bearing career of the patient.

On the other hand, it is argued by the advocates of radical treatment that Cæsarian section offers additional advantages in the way of better prospects for the child, and at first glance such an argument appears convincing, more particularly when he admits that less than 30 per cent of the children in his service were saved. It should, however, be remembered that placenta prævia is a complication which tends to become manifest at a period when the child's prospects are minimal. His figures show that it occurs eight times less frequently at term than at premature labor, so that we ordinarily have to deal with children which have no chance for continued existence after birth, or which are so premature that they readily succumb to the loss of blood or other conditions incident to the condition. Consequently, it seems justifiable to demand that Cæsarian section should be employed only under the strictest indications, and should not be considered as a routine method of treatment. In addition, it should be realized that placenta prævia is inevitably associated with a high infantile mortality, and consequently obstetricians should hesitate to advocate methods of treatment which, while they may save the lives of a few more children, do so at the expense of increased maternal mortality.

Tobacco and Work.

In an editorial on this subject the *British Medical Journal* of July 2, 1921, refers to an article on the output of users and non-users of tobacco in a strenuous physical occupation, by Baumberger, Perry, and Martin in the *Journal of Industrial Hygiene* for May, which was the second article of a series of records dealing with the general significance of the use of tobacco in industry. The previous article dealt with the effect of tobacco on strenuous mental work of a routine nature, the occupation chosen for investigation being telegraphy; it was found that the heavy smokers did not maintain the level set by the light smokers; there was a lessened ability to sustain output at the end of the working day, and a diminished power to react by increased effort to an increase in the volume of work. Heavy smokers had a better output during the first hours, but this was not enough to compensate for the lowering of efficiency toward the close of the day. The present study, on the other hand, required a routine occupation in which some process was repeated many times during the day and was dependent on the speed of the individual worker, unaffected by the rate at which machinery was driven; bottle making was chosen as best meeting the required conditions.

In the factory where the investigations were made the old method of blowing glass bottles by mouth had been largely abandoned, and the work was for the most part done by machinery manipulated by certain skilled workers, with the aid of inexperienced helpers; in some machines, however, the whole process was carried out automatically under the supervision of an unskilled attendant. The average age of the eighty-five skilled workers studied was thirty-six years, and the average number of years spent in the glass industry was twenty. The men were largely native-born in the United States, with little schooling, and, on the whole, a very steady, clean-living class, their earnings being from eight to ten dollars a day. Their smoking and chewing habits were studied by direct questioning, and by observation and indirect conversation. Of the men 8 per cent did not use tobacco, 83 per cent smoked, 29 per cent chewed, and 20 per cent both smoked and chewed. Apparently 9 per cent chewed but did not smoke.

From the data obtained it appeared that the workers who chewed had a much lower output rate than those who only smoked or did not use tobacco in any form; the light smokers, however, showed some inferiority in output rate, and the heavy smokers a slight superiority. The authors seek to explain this result by surmising that "insufficient use of tobacco has more deleterious effects than a larger use which might confer an immunity." But it seems more likely that the differences are not statistically dependable, and it would be well to have more details than the article gives about the workers investigated and their habits of work. The low output of the chewers of tobacco as compared with smokers is probably due, as the authors suggest, to the greater absorption of nicotine. The conclusions drawn from the investigation are that in a strenuous physical occupation of this type smoking has comparatively little effect, but that the output rate is distinctly lowered by chewing.

Studies in Carbon Monoxide Asphyxia.

HAGGARD, in the *American Journal of Physiology* for July, 1921, states that death under carbon monoxide asphyxia is due to failure of respiration. This is in the nature of a fatal apnœa vera. The anoxemia resulting from the formation of carboxyhemoglobin induces excessive breathing; and respiratory failure follows the excessive loss of CO_2.

Oxygen deficiency caused by carbon monoxide, even in advanced asphyxia, is not in itself sufficient to cause impairment of auriculo-ventricular conduction. Following respiratory failure, however, the increased anoxemia from this cause speedily

results in the development of heart block through its various stages.

By restoring respiration and rapidly eliminating the carbon monoxide by means of inhalations of carbon dioxide and oxygen, cardiac conduction is restored to normal following the development of block.

The cardio-inhibitory center maintains its activity longer than does the respiratory center. This center is stimulated by the increased Ch which occurs during respiratory failure. From this there results a temporary cessation of auricular activity. This period of inhibition is prevented by the administration of atropine.

When respiratory failure is prevented by means of inhalations of 8 or 10 per cent carbon dioxide, the carbon monoxide combination with hemoglobin rises to an unusually high percentage without any evidence of impairment in a-v conduction. This indicates that there is no direct toxic action of carbon monoxide upon the cardiac conducting system.

Illuminating gas results in an earlier development of respiratory failure than does pure carbon monoxide in corresponding concentration.

Electrocardiographic records are given from two animals which differed from the rest in that one developed a transient period of alternation involving the R and T waves and the other presented, during the time of complete a-v block, a condition resembling auricular fibrillation or flutter.

Paresis Treatment by Arsphenamine and Mercury.

In the *Boston Medical and Surgical Journal* of July 14, 1921, BONNER cites a series of cases that were treated at the Warren State Hospital, Pennsylvania, between July, 1918, and July, 1920, with a view to determining possible benefit in the administration of combined treatment. In order that a comparison may be made, the records of untreated admissions during this period, suffering from paresis, were reviewed, and some interesting facts brought forth, especially regarding the brief tenure of life in this disease. All the cases studied were diagnosed at staff-meeting and further confirmed by positive laboratory findings. The patients were not selected, but varied in both physical and mental state. The number of cases treated is small, but results obtained are in agreement with the findings by workers with a larger group.

There has been considerable interest shown in this subject by a number of State hospitals during the last five years, and the value of intravenous injections of arsphenamine in neurosyphilis has been well brought to test. In this work mercury inunctions were employed, and also a brief course of potassium iodide. The object of this paper is to record the findings as observed in a two-year period at this institution.

What benefit was accomplished will have to be measured by such facts as the duration of life after admission, capabilities exhibited after the initial disturbance, and continued improvement and conduct sufficient in some cases to warrant a parole from the hospital. These data, of course, are readily obtainable from the case histories and daily observation of the patient. It was interesting from a psychiatrical view-point to note a peculiar form of insight exhibited by many of the paretics under treatment, manifested in their anxiety and coöperation to receive treatment. This, of course, refers to the less deteriorated cases.

Weekly treatments were given twenty-eight males diagnosed general paresis, beginning with 0.3 gm. arsphenamine, which was pushed as rapidly as conditions would permit, to the maximum 0.6 gm. There were but few unfavorable reactions in well over three hundred injections. It was intended to use blue ointment to a point of saturation during the entire period, but shortage of help prevented this valuable adjunct being used as consistently as was desired. Each case also received, for one month, potassium iodide in a dosage of thirty grains per day.

It was found that the Wassermann reaction was influenced but little in the purely paretic types, even with the most intensive

treatment. One case, bordering on the paretic zone, as interpreted from the gold sol reading, was reduced; one clearly in the paretic zone was reduced, and one spinal fluid was changed so that the gold sol reaction was absent. Among the cases allowed to go home, but one improved, as far as the serology was concerned, which is an interesting inference.

The average time that the disease had existed, both in the treated and untreated cases, previous to admission, reckoned in months, was fifteen. The average duration of life in the treated cases that died in the hospital was five months, and four months for the untreated cases. The remissions in the treated cases were longer sustained than in the untreated, and the former made much better ward cases.

Of the treated cases, eight have been discharged, or twenty per cent, and but two of the untreated cases have been removed from the hospital, or four per cent. At the expiration of the two-year period, twenty-seven out of forty-two untreated had died, and of the treated, six died before a minimum series of ten treatments had been given, and two died shortly after the series was completed. Twelve of those completed are still residents of the institution, and but two of this number are bedridden.

Continued observation of the treated cases is necessary as a criterion of the advisability of routine intensive treatment. Surely, if some benefit is obtained, the matter should not be lost sight of, and a measure of relief offered in this deplorable condition. It must be remembered that the majority of the cases that State hospitals have to deal with are far advanced. In the interests of humanity, if the general practitioner would consider every syphilitic as a potential paretic, paint the future as it may possibly be, apply intensive treatment, and advise a routine Wassermann and lumbar puncture at least once a year, keeping careful records, the number of paretics during the ensuing years would be greatly diminished and thus many wrecks prevented.

Bonner summarizes his article as follows:

1. Course of duration of bedridden stage seems lessened by treatment, and dying patients in this stage do not linger so long in the usual wretched state.

2. Serology bears no relation to remissions.

3. Duration of ward life seems lengthened.

4. The results are found to be favorable to treatment, but do not warrant a change in prognosis.

5. Certain cases respond and others do not. No explanation is offered, unless it may be that the meningeal types, as have been reported, offer a better therapeutic opportunity.

Enteroptosis and Dropped Kidney: A New Method of Treatment.

McCAY, in the *Indian Medical Gazette* for July, 1921, states that when the diagnosis is made the following line of treatment is to be carried out:

1. The patient is kept strictly in bed for a month or six weeks, according to the severity of the case. The foot of the bed is raised by wooden blocks fifteen to eighteen inches high. The shoulders of the patient are kept low, but the head may be raised to a comfortable position by pillows. A nurse should be employed if possible and a bedpan used. The more strictly the patient is kept at complete rest in the prescribed position the better the results will be.

In patients who absolutely refuse to employ the bedpan the treatment will often give excellent results, but success is not so certain as if absolute rest is maintained.

2. Massage of the abdomen is carried out for half an hour twice a day, olive oil being used as a lubricant in the hot weather, but if it is not objectionable to the patient, massage with cod-liver oil is preferable in the cold weather. Massage is also used to the rest of the body, and the muscles of the abdomen are improved in tone by exer-

cise. The patient is instructed to raise the legs from the bed, keeping them extended all the time, and keeping quite flat on her back in bed. At first the patient can only raise one leg at a time as a rule, but soon she will be able to raise both together for a considerable number of times. The limb muscles are also kept in good tone by massage and by exercises against resistance. The spinal muscles are exercised by the movement of arching the back. It is of course understood that the patient keeps in the supine position in bed while these exercises are carried on.

3. The bowels are kept open by suitable doses of an aperient like cascara evacuant.

4. The diet need not be so restricted as one might suppose. Plain simple food of almost any kind is permissible, and the patient is usually gratified to find that a normal diet can be digested without pain or discomfort within a few days of the commencement of the treatment.

Any obvious errors of diet will be corrected, such as the eating of pastry, excessive starchy foods, sweets, etc.

After the course of rest in bed the patient is fitted with a belt to support the lower abdomen. It is a good thing to attach a flat porous rubber sponge to the inside of the belt. The sponge is cut so as to be thick below and thin above. The lower border of the sponge pad should be just above the pubes. After a month or two the belt can usually be discarded. In cases of pronounced downward displacement of the kidney a crescent-shaped kidney pad is fixed to the inside of the belt with a safety-pin. This can usually be much lighter and thinner than the ones ordinarily employed. It is essential that the belt should be kept from riding up by fixed garters or by straps encircling the thighs.

The kind of corset that is much worn by ladies at the present time is quite suitable, provided that it fits well and supports the lower abdomen without constricting the lower part of the chest.

The explanation of the patient's symptoms is probably the dragging that takes place on the peritoneal attachments of the viscera, especially those of the kidneys, and the kinking of the bowel, particularly the pyloric end of the stomach. The effect of treatment is to shorten and firm up the peritoneal attachments, to straighten out the kinks, and to increase the amount of fat which supports the kidneys and other viscera. The additional support that is given by the improved tone of the abdominal muscles is also a factor.

Whatever be the theoretical considerations involved, the important matter is such cases show a remarkable improvement in health, appearance, and comfort.

Chancroidal Infections.

PEARCE, in the *United States Naval Medical Bulletin* for July, 1921, states that two fairly well defined types of chancroid have been observed by him: (1) A superficial type with a marked tendency to increase of surface area involved, "the creeping type," and (2) the deep type in which the surface area involved is not large but in which there is a pronounced tendency to involve the deeper tissues. Apropos of the latter, one case was observed in which the surface opening was pin-point in size with discharge of a purulent material. Upon passing a probe into this opening a cavity was located, and when the opening was enlarged by incision the cavity was seen to be about the size of a pea or slightly larger, and with the general characteristics of a chancroid—irregular base and walls with discharge. It was on the glands near the frenum, and leading from it was a burrow extending under the frenum.

He has seen many cases of severe chancroidal infections following bilateral slit of the prepuce. These cases were good examples of the superficial type of chancroid, but were very large in area, usually involving the entire flap edges, and were accompanied by extensive edema and inflammation of the flaps. They improved very rapidly under careful and thorough treatment. In this connection he has noticed

that many of the dorsal or lateral slits are made so long that in a later circumcision the mucous membrane has been encroached upon to such an extent that an insufficient amount remains for suture to the skin. It is believed that in most cases these slits are unnecessary if sufficient patience is exercised in the use of prolonged frequent immersion in hot boric or hot magnesium sulphate solutions. When these fail and it becomes necessary to perform the slit, care should be used that it be not extended too far, and the incision edges should be cauterized with nitric acid, the actual cautery, or other similar agent.

In the treatment of his cases a factor of predominant importance, and one that he believes to be essential if good results are to be obtained, was cleanliness of and careful attention to the parts involved. All cases were seen at least once each day by the medical officer and many times during the day by the hospital corpsman in charge.

Two methods of treatment were employed, the method first to be described being used in the larger number of cases, the second method being employed but recently. Their description follows:

In the tincture of myrrh method the penis is carefully cleansed with soap and water. It is then dressed with tincture of myrrh in a strength of one part of the myrrh to eight parts of water. If the lesion is on the corona a small piece of cotton well saturated with the solution is placed in the corona so that it comes into intimate contact with the lesion.

In the small deep lesions a wick of cotton saturated in the solution is packed into the lesion. The penis is then coverd with a gauze dressing saturated in the solution. Parchment paper or other impermeable material is then placed over the gauze and the dressings covered with a roller bandage. After the dressing is completed the gauze and cotton are kept constantly moist with the solution. These patients are usually so anxious to have the lesion heal that they need no urging to come to the dressing room frequently for renewal of the solution.

As a preliminary to the above treatment, and sometimes in addition to it, in those cases in which the edema and inflammation are prominent features the penis is immersed for period of thirty minutes in hot magnesium-sulphate solution or hot boric-acid solution at frequent intervals.

Three times daily when the sun method is employed, the penis, especially the part involved, is cleansed carefully with green soap and water, each cleansing being followed by thorough drying.

In the intervals between these cleansings the penis is exposed to the sun's rays, care being used to not continue the exposure to the point where it causes a dermatitis. The only dressing used when treatment is not employed is a covering of gauze.

The results under both forms of treatment were uninterrupted improvement, but the improvement under the "sun" treatment was astonishingly rapid, especially in the superficial type of chancroids.

In conclusion, Pearce believes that the most important factor in the treatment of chancroids is cleanliness, and that where possible to employ it the treatment by exposure to the sun's rays is an extremely efficient method of treatment. He believes that it is not often necessary to perform dorsal or lateral slits of the prepuce, and that in the few cases where it is necessary it should be correctly performed. Where impossible to employ the sun treatment, the treatment with tincture of myrrh solution is of great value.

Treatment of Asthma by Autogenous Streptococcal Vaccines.

ROGERS, in the *British Medical Journal* of July 16, 1921, in concluding his article on this subject, states that in 15 per cent of the cases the treatment failed to give material relief of a lasting nature; in 32.5 per cent great relief was afforded, but it was either not permanent or it was incomplete, and in 52.5 per cent the patients remained well when last heard of, from one-half to four years after the treatment.

Studies on the Consecutive Phases of the Cardiac Cycle.

WIGGERS, in the *American Journal of Physiology* for July, 1921, states that since previous observations had indicated that the duration of systole is not entirely determined by the length of previous diastole, an investigation was undertaken to determine what other factors might be concerned, and the following conclusions were reached:

1. An increase in venous return above normal causes a lengthening of ventricular systole, quite independent of diastole length. This occurs as a result of the prolongation of the ejection phases, the isometric phase of contraction having a tendency to be abridged. Since the initial pressure was always elevated when this occurred, we may formulate the conception that, whether or not the mechanical energy liberated by contraction is fundamentally determined by the initial length of the ventricular fibers at the inception of contraction, the duration of systole, at constant heart rates, varies directly as the initial intraventricular pressure under such a variety of inflow conditions as it is possible to produce in the mammalian heart *in situ*.

2. An increase in arterial resistance acts to abbreviate systole, independently of changes in diastolic length. This abbreviation of systole takes place in spite of a slight tendency of the isometric phase to lengthen, and is therefore due to a shortening of the ejection phase. This shortening of the contraction phase is apparently due, as in skeletal muscle, to the fact that the muscular shortening is terminated earlier by the greater load acting during the process of shortening.

3. When the increase in arterial resistance is of such grade and type that the ventricle cannot empty itself effectively, a marked retention of blood occurs, and the diastolic volume and initial tension increase, in consequence. As such an increase in initial pressure has a tendency to lengthen systole, two opposing influences come into operation in such elevation of arterial resistance, viz.: (*a*) the tendency of higher arterial resistance to abbreviate; and (*b*) the tendency of increased initial tension to lengthen systole. Both factors, no doubt, operate to influence the duration of systole whenever the arterial resistance is increased, but one factor usually predominates. When arterial resistance increases as a result of intense peripheral vasoconstriction, systolic retention is not pronounced and initial tension only slightly increased. Consequently the first factor predominates, and systole decreases. When the aorta is stenosed, the accommodative capacity of the aorta is reduced and large volumes of blood are retained within the ventricle, consequently the initial tension increases very markedly. The second factor then predominates and systole lengthens. When the elasticity of the arterial system or the caliber of the vessels is insufficient to accommodate readily the systolic volume expelled by the ventricles, an increase in peripheral resistance may also act to elevate initial tension and lengthen systole. This explains the lengthening of systole consistently found by Patterson, Piper and Starling in the heart-lung preparation, and we may expect to find such lengthening also in arteriosclerosis involving the larger vessels.

4. The duration of systole is determined solely by changes in the length of previous diastole *only* when the initial intraventricular pressures and the aortic pressure at the beginning of diastole remain nearly constant. Thus we find that, during vagal slowing and during the acceleration subsequent to such stimulation, the duration of systole is predominantly determined by changes in initial pressure, rather than the length of preceding diastole. Again, when slowing occurs in association with an elevation of arterial resistance, as during asphyxia or adrenalin, the duration of systole may be abbreviated through the influence of such higher resistance. There is evidence also that in the case of adrenalin action or stimulation of the accelerator nerves, there is a specific effect on the ventricle which acts independently of these influences to shorten the contraction phase.

5. These observations indicate that not only under abnormal conditions of venous and arterial pressure, but also under such conditions as may be considered quite normal, the systolic portion of the ventricular volume curves cannot be regarded as superimposable at different rates of beat.

6. Since the phases of diastole alter so little in duration, however, during the most diverse conditions of the circulation, it is not possible from these observations to draw the same deductions in regard to the superimposability of diastolic portions of the volume curves.

Repeated Medication for Curing Infections.

Ross, in the *British Medical Journal* of July 2, 1921, states that encouraging results are now being reported in the treatment of various parasitic infections—spirochætes, intestinal amebæ, plasmodia, Leishmaniæ, piroplasmodiæ, trypanosomes, skin parasites, and even bilharziæ and filariæ. Some years ago all our efforts seemed to be aimed at finding, if possible, some agent which would extirpate the invaders after a single dose, or at the most after a few doses; but we are now observing that the medication must be repeated much more often than we had supposed. Even to-day, however, the number of doses which may be required to produce complete cure remains a very open question, and is discussed only in the light of empirical results, which are often few and not too decisive. It is high time, therefore, to examine the theoretical principles upon which repeated medication may be or should be given.

The best known case is that of malaria. It has been recognized for centuries that cinchona bark or its derivatives will generally reduce an attack or a relapse of malarial fever in a few days, but nothing definite has been laid down as to how long the drug should be continued. When Ross went to India in 1881 the practice was to give the patient 30 grains of quinine daily (sometimes much less) while the fever persisted and for three days afterwards, and then to discharge him to duty as "cured." He protested against this custom in the *Indian Medical Gazette* for February, 1896, and advised at least one fortnight's treatment in hospital. Later he increased this period to three weeks, but when he himself was infected in 1897 he thought still better of it and took 10 grains of quinine daily for four months; he did not have a relapse. In his lectures, and in his book, "The Prevention of Malaria" (1910), Ross recommended four months', and suggested even six months', continuous treatment. Early in the present century the Indian military authorities ordered six weeks' treatment, with good results. During the war practice varied greatly, the duration of treatment being abbreviated by military exigencies on one hand and prolonged by the issue of prophylactic doses of quinine on the other hand. A period of two months was laid down in 1917 by the War Office at Ross' suggestion (War Office publication, Observations on Malaria, 1919) for men invalided home.

When Sir Alfred Keogh established a number of special malaria hospitals in the United Kingdom early in 1917 many experiments were commenced with a view to producing complete and early cure, but the results were most disappointing, and relapses occurred in large percentages of the cases after trial of many lines of treatment —intravenous and intramuscular injections of quinine, heroic oral doses, combined methods, quinine with arsenic, etc., kharsivan, and several nostrums which had been commended in medical literature—though, of course, all the lines of quinine medication caused great improvement while they were being given, except perhaps in very rare cases. Thirty grains of quinine daily for three weeks were followed, after stoppage, by relapses in a large percentage of the cases. Even treatments commencing with 100 grains a day and continued for nearly a month in smaller doses gave no guarantee of permanent cure, though they

seemed to yield slightly better results on the average than did the lower scales of dosage. On the other hand, only eight grains daily in four doses appeared to be as effective in reducing fever and parasites, as estimated by careful countings. But five grains daily failed to prevent relapses—even while being taken; and without any quinine at all the patients remained heavily infected and generally became more and more anemic. He concluded, therefore, that eight grains daily or more sufficed almost invariably to improve the cases greatly while being taken, but failed to cure them completely even after six weeks' administration or more. There is much other literature to the same effect. What is the explanation?

By far the most probable theory to account for relapses in malaria is the one described in his book, and studied by D. Thomson and himself. According to this theory the parasites continue to breed in the blood by the known method from the moment of infection until the last of them has died out; but their numbers are always varying greatly. A normal man of 10 stone (64.7 kilogrammes) weight contains (by one estimate) about 3,000,000 cubic millimeters of blood, and, allowing 5,000,000 red corpuscles per cubic millimeter, he should have 15,000,000,000,000 red corpuscles. He estimated that the lowest number of asexual mild tertian parasites able to cause fever was about 100 per cubic millimeter, or 300,000,000 altogether, with a much higher figure for malignant tertian (his cases were old infections). When there is considerable or high fever, the numbers range from about 5000 to 300,000 per cubic millimeter; but in a fatal case in Mauritius, in 1908, he estimated that the parasites must have numbered over a million million. Between the relapses—that is, when there is no fever—the parasites often become too few to be found at all in the small quantity of blood examined (say 1 c.mm.); but even if there be only one parasite per cubic millimeter, that would mean that there might be 3,000,000 in the body altogether. Thomson often succeeded, however, in finding very small numbers per cubic millimeter even when there was no fever, and these numbers generally increased two or three days before another relapse of fever. Similar variations in numbers of pathogenic organisms are found in other diseases; but, of course, there are certain species of parasites, such as ascaris, uncinaria, filaria, bilharzia, which, according to our present knowledge, are not capable of multiplying inside of the body, except by fresh arrivals from without.

What causes variations in the numbers of those parasites which can multiply within the body? Why do they not always maintain a fixed population? Ross believes either that the host's resistance varies or that an overcrowding of the parasite population produces substances injurious to themselves. Perhaps the latter hypothesis may explain the limitation of the parasite population when it has reached a very high figure; but the resistance hypothesis seems necessary to explain the entire extirpation of the invaders, which certainly often occurs without treatment in many diseases, such as malaria and relapsing fever, for example. There may also be some biological law which limits the numbers of non-sexual cell divisions. However this may be, there is much evidence to suggest that unfavorable climatic conditions, fatigue, starvation, excess, or concurrent illness tend to precipitate relapses—at least in malaria. The picture most of us have formed is that while the infection continues there is a constant struggle, with varying fortunes to either side, between the invaders and the opposing forces of the host; and that in hosts who survive the invaders are finally mastered, though, perhaps, not until years have elapsed. There is, he believes, a general mathematical theory that during any constant struggle between opposing forces (for example, between stream and wind) a wave condition of alternating success or failure for either side is produced. The alternating "rallies and relapses" seen in so many diseases, including malaria, seem to suggest this class of phenomena.

By our treatment, then, we are called

upon to help the patient in his fight. We may attempt this either by trying to assist his natural powers of resistance, or by attacking his enemies by specific medication. Many people write as if the former process is the proper one, but unfortunately we really do not know how to assist natural powers of resistance. Keeping patients at rest, "feeding them up," giving them tonics, etc., sound very well, but the patients too often continue to relapse just as before. We have little real evidence to show that people who are in the best of health at the moment of infection suffer less severely when they are invaded by some parasitic infection than do people who have previously been in poor health—rather the converse, in fact. Certainly, he thinks that rest and good feeding help patients to overcome the illness due to parasites. But that is another point; we must not confuse the illness caused by parasites with the parasites themselves; and a patient who is better able to resist the effects of the parasitic invasion does not necessarily possess greater natural power of extirpating the invasion. We are too prone to confuse these two issues. Indeed, experience tends to show that the healthy, vigorous, full-blooded young man is more likely to suffer from very acute attacks than are less healthy people. The obstinacy of infections probably depends chiefly upon unknown natural qualities in the blood or tissues, favorable or unfavorable to the invaders.

However this may be, the clinician is always driven to try some parasitical drug if one be known. If we class specific serums in this category, and possess them for a given kind of infection, we use them for this purpose; but if not, we have to fall back upon other agents which have been empirically recommended, sometimes after great general experience, such as quinine for malaria or ipecacuanha for amebic dysentery. But the question at issue is, how exactly are we to use such drugs?

Apparently most people have usually thought that a few very large doses may be able to destroy all the invaders at a blow—hence heroic doses both of quinine and of ipecacuanha. But are we so sure of this? There are reasons for thinking that the patient's body is so affronted by the massive dose that it endeavors to cast it forth at once. The studies "On Quinine in Animal Tissues," by W. Ramsden, I. J. Lipkin, and E. Whitley, published some years ago, certainly do seem to suggest that a heroic dose of quinine put straight into the blood is cast out by it almost at once, while a much more moderate dose is likely to remain there longer and to do its work on the plasmodia. Several biologists to whom Ross has mooted the matter are inclined to agree with him in this. The patient's blood and tissues are obliged, so to speak, to protect themselves against any foreign chemical agents as much as against invading parasites. When suddenly subjected to a great dose of something, they adopt the usual course and get rid of it as soon as they can, not being aware that the dose was intended to help them—to speak metaphorically. According to this hypothesis, then, a large dose may possibly be cast out so rapidly that in the end actually a smaller amount of it may reach the parasites to poison them than if a small and more easily tolerated dose had been given to begin with. Probably this accounts for the little difference between the effects of small and of large doses which were observed during the war in the home hospitals. Where Ross found a little difference between the results of say 10 grains a day and 100 grains a day, he suspects that there has been some fallacy in the arguments which led to the adoption of the larger medication.

But another point must now be remembered. Whatever dose be given, are we sure that it will reach all the parasites in the body simultaneously? Perhaps so in certain cases, as in those of parasites which live in open sites, such as the skin and intestines, and are easily attacked by drugs—though even these cannot always be destroyed at once. But how can we expect to obtain such a decisive result in the case of millions of organisms capable of con-

stant reproduction and occupying more recondite positions in the body? We must disabuse ourselves of the notion that the parasites in a host are like fish in a bowl, which can be destroyed all together by mixing a single dose of poison with the water. They must be much more like the enemy on a battle-field, many of whom will escape in their trenches and dugouts the most violent barrage; and, as Ross for one has always thought and taught, there must be many recesses and backwaters of the circulation which, possibly, no medication bearable by the host can reach. This has been ably suggested and perhaps proved by the chemical work just mentioned—especially by I. J. Lipkin's paper. According to it, quinine is concentrated in the suprarenals, kidneys, and spleen; cast out quickly from the lymphatic glands and the blood; and destroyed by the liver and the muscles. If so, even in the quickly moving circulation, large numbers of the plasmodia are likely to escape any dose that we can give, especially in view of the fact that a stasis of them often occurs in certain capillaries. Lastly, if we lift the quinine barrage for a long enough interval the enemy will immediately begin to bring up reënforcements in the form of fresh generations of spores and make good what reductions we had previously succeeded in effecting.

Feeding Infants with the Czerny and Kleinschmidt Butter-flour Mixture.

In the *Archives of Pediatrics* for July, 1921, MITCHELL reports his experience with the butter-flour mixture in 32 infants with the proportions given by Czerny and Kleinschmidt. He states that emphasis should be laid upon the necessity of following closely this method. For convenience he estimated the amounts in tablespoonfuls. Thus it was sufficiently accurate to use 2 level tablespoonfuls of melted butter, 2½ level tablespoonfuls of flour, 1½ level tablespoonfuls of sugar, to 10 fluidounces of water. In whatever way the mixture was modified, the amounts of butter and flour remained equal. In certain cases he had found it an advantage to reduce the amounts of butter and flour to less than 20 grammes each to 300 Cc. of water. (See original article of Griffith in the GAZETTE for November, 1921.)

In some cases the sugar should be decreased in amount or omitted entirely. Again, one to three feedings of butter-flour mixture a day were sometimes given as substitutes for the ordinary cow's milk mixtures which constituted the other feedings, and he had occasionally alternated it with breast feedings, as had been successfully done by others. It is quite simple to manipulate the percentages of fat, carbohydrates and protein in this food as the indications arise, always, however, maintaining the fixed relation of the butter to the flour. Based upon the analysis of Jones, one fluidounce of stock solution might be said to represent 26.6 calories. The mixture containing two-thirds of the stock solution and one-third milk might be said to represent fat 4.6 per cent, carbohydrate 8.2 per cent, protein 1.5 per cent, with a caloric value of 24.6 to the fluidounce. Jones found that the fat of the stock solution after cooking consisted entirely of neutral fat and that no traces of fatty acids were discoverable. Whatever might be the cause of the good results produced by the butter-flour mixture, and whatever the relationship which the volatile acids might bear to this, it is at least certain that the results are good, and that these volatile fatty acids are removed.

The 32 cases in his series were for the most part those who had not seemed to thrive when fed on the more commonly employed simpler modifications of cow's milk. The condition was variously diagnosed as gastrointestinal indigestion, malnutrition, disturbance of balance, dyspepsia, depending upon nomenclature adopted and severity of symptoms. This mixture, like other foods, had its indications and counter-indications, and its success in feeding depended upon the proper selection of cases.

The most severe forms of malnutrition, where the tolerance for any sort of food was low, may grow decidedly worse when butter-flour mixture is used. The food should therefore be given cautiously, if at all, to infants suffering from infantile atrophy (athreptic decomposition). Other conditions that might not be expected to respond favorably, nevertheless did so in certain instances. Among these are certain cases of eczema and certain instances of gastrointestinal indigestion in which vomiting is a marked feature. He found that it was the infant whose low body weight was due to failure to properly metabolize sufficient cow's milk who responded most favorably to the Czerny-Kleinschmidt food. In spite of high fat content of butter-flour mixture, vomiting seldom occurred. Of 32 cases, only two had vomiting follow as a marked symptom. The stools were rather characteristic light yellow, resembling a breast-fed baby's stool; odor not offensive but somewhat aromatic; starch was invariably found. Mucus was seldom present; the stools were acid in reaction and varied from one to three in 24 hours.

The gain in weight in infants who thrived upon butter-flour food was usually satisfactory and often wonderful, and in his experience was shown quite promptly. Some gained weight so rapidly that it could only be explained on theory of water retention. Thus one baby gained 7 ounces the first night and 20 ounces in six days. The majority received the treatment for a month or longer. The stopping was usually done because progress was so excellent that it appeared time to send the infant to its home. The food was not difficult for the average mother to prepare. The amount of the mixture fed depended upon the age and weight of the child. Czerny and Kleinschmidt recommended 120 to 200 grammes of food daily for each kilogramme (1¾ to 3 fluidounces per pound), 75 to 90 calories per pound of body weight per day in most of these cases. In most of his cases sweating was present, and as a consequence a condition developed spoken of as "butter-flour rash." The removal of a baby from butter-flour mixture was not a procedure to be accomplished quickly.

Of the 32 infants fed on butter-flour mixture, 23 responded favorably by gain in weight and improvement in general condition. Digestion was good, vigor of tissues increased, and maximum amount of sleep was obtained. In analyzing histories of nine infants that did not improve on butter-flour mixtures, in seven the type of feeding was not responsible for failure. The two great lessons which his study taught were: (1) that when fed with butter-flour infants might tolerate fat in a manner which could be accomplished probably by no other means yet known to us; and (2) that the truly remarkable results which often follow are a strong proof of the great need which the infant's anatomy possesses for a food containing a sufficiently large amount of fat.

Sodium Bromide Solution in Pyelography, and its Toxicity in Comparison with Other Media.

MERRITT, in the *Boston Medical and Surgical Journal* of July 14, 1921, states that of all the mediums known, collargol is undoubtedly the most commonly used. However, it is known to be injurious to the kidney tissue, and several deaths following its use have been reported. Argyrol, cargentos and argentide have the same action on the kidney tissue as collargol.

In 1919, following Weld's experiments, working in conjunction with Willis of Rocky Mount, N. C., he used sodium bromide in a 20-per-cent solution on three cases. It was known to him that many urologists over the entire country were at that time using his preparation with good results. Willis had previously used this same medium on several cases, and it was at his suggestion that he employed this substance instead of some of the more common ones he had used previously. His results were most satisfactory. The pictures were distinct and clearly outlined. None of the patients suffered any local irritation

or pain, and in no case was there the slightest evidence of any reaction. Following that series he has used sodium bromide in the same strength on four other patients. In every one of these the results were equally satisfactory.

He summarizes his article as follows:

1. It is believed that, of all the mediums in use at the present time in pyelography, sodium bromide is the least toxic.

2. Sodium iodide is the next best medium.

3. Potassium iodide and thorium nitrate have a high toxicity, and the use of these mediums is not to be encouraged.

4. Sodium bromide is non-toxic, cheap, easily prepared, readily accessible, non-irritating, and, at the present time, would seem to be the best medium as yet brought forward. For pyelography, a 20-per-cent solution is recommended. The drug should be chemically pure and sterilized by boiling, prior to use.

Some Aspects of Pernicious Anemia and its Treatment.

HURWITZ, in the *California State Journal of Medicine* for July, 1921, states that although impressions gained from daily contact with the patient are invaluable, we must all admit that they constitute a very unsatisfactory standard, because they permit of the widest latitude to individual opinion. By far more helpful as an immediate index of the value of any form of therapy, as well as a guide to the ultimate prognosis, is the detailed study of the blood reaction in pernicious anemia—that is, the presence or absence of blood features indicating bone-marrow stimulation or depression. This permits us to predict, whether the patient is about to start upon a period of improvement or whether an advance of the disease is imminent, knowledge which makes possible a more precise and a more logical choice of our remedies.

For this reason much attention has been given during the past decade to methods of testing the relative activity of the blood-destroying and blood-regenerating forces at work in pernicious anemia. Inasmuch as the blood picture at any given period in the disease represents a balance between blood destruction and blood formation, it is possible to obtain valuable information concerning the progress of the disease by determining which of these two factors is in the ascendancy. A single blood examination might not be helpful, but to follow the changes in the blood picture from day to day would tell us how the balance between destruction and formation was swinging, and also how much progress to anticipate from any given treatment.

Because of the hemolytic features of pernicious anemia there has been a tendency to emphasize, for the most part, the clinical and laboratory evidences of blood destruction, and to stress too little the evidences of compensatory bone-marrow activity, which from a therapeutic view-point is of the greatest importance. Clinical observers know well, for instance, that little is to be expected in the way of a marked remission in patients in whom the bone-marrow is inactive or its function greatly disordered. An accurate idea of the functional efficiency of the marrow should be based upon the behavior, not on any one of the elements there produced, but upon a careful interpretation of all the elements of bone-marrow origin. Thus in spontaneous remissions, or in those induced by some therapeutic measure, such as transfusion or splenectomy, satisfactory bone-marrow activity will be shown by an increase over normal of the young red cells (reticulated cells) together with increases over the former low level of the polymorphonuclear leucocytes and of the blood platelets. Inactivity of the marrow, on the other hand, will be indicated by a diminution of the young red cells and by a marked diminution in the polymorphonuclear leucocytes and blood platelets. The latter elements, in particular, have been found by Minot and others to be valuable indicators of bone-marrow efficiency, since transitory alterations in the number of these are less likely to occur than are changes in the polymor-

phonuclear leucocytes. By following the formed elements of the blood in this way, we may obtain a more precise index of bone-marrow function and a better criterion of the value of treatment.

In the absence of more definite knowledge concerning the etiology of pernicious anemia, our best efforts must be confined to combating the symptoms of the disease. Such palliative treatment may rely only upon the time-honored regimen in which rest, diet and arsenic are the essential features, or resort also to the more radical measures of transfusion, splenectomy, and the removal of foci of infection. Notwithstanding that these more radical procedures have been in vogue for more than a decade in the treatment of this affection, we are only now getting more insight into their value and limitations, largely as a result of the painstaking observations of a number of workers in the best clinics of this country. These problems, after all, cannot be settled by the experience of a single observer, or of many observers over a period of many years. And although it is his purpose to dwell more particularly upon the merits of transfusion, splenectomy and the removal of foci of infection, Hurwitz lays emphasis on a few points concerning the simpler therapy at our command.

It seems that many patients with pernicious anemia improve by rest alone. In all anemic states, and more particularly in the severe anemias, absolute rest will relieve patients not only of cardiac strain and fatigue, but make possible besides more rapid blood regeneration; and when combined with a suitable diet, symptomatic improvement may follow even in the absence of other remedial measures.

Particular attention should be given to the diet of these patients. It should be plain, generous, nutritious, and well balanced. And inasmuch as a toxic destruction of protein is known at times to occur in this disease, forced feeding of protein food may produce a more normal nitrogen balance. That such foods exert also an especially favorable influence on the anemia has recently been emphasized by the experiments of Whipple and his co-workers. They have shown that the curve of hemoglobin regeneration proceeds much more favorably upon a diet of meat protein (beef, liver, etc.) than it does after the ingestion of carbohydrate food (bread, milk, rice, potatoes). The latter, however, as well as the fats, have an important protein-sparing action and help to lessen the excessive protein breakdown which frequently results from the cause of the anemia itself or from the changes it has produced.

It may well be that these dietetic-hygienic measures have been responsible for the improvement noted in many patients whose well-being has been attributed to the use of iron and arsenic. The medical tradition as regards the beneficial effects of arsenic, although very strongly rooted, seems to be weakening as a result of more careful clinical observations. There are those whose experience justifies the view that arsenic has not the hematopoiesis-exciting and antihemolytic properties with which its advocates have endowed it. The chief value of arsenic doubtless resides in the beneficial effects which it has upon the metabolic functions, and for this reason it should be given a place in the management of these patients.

The judgment of Hurwitz concerning the therapeutic value of transfusion in pernicious anemia has been based almost entirely upon its usefulness as an immediate emergency measure in tiding a patient over a severe relapse or in inaugurating a remission. Any one who has employed transfusion extensively in this disease can testify to the remarkable symptomatic benefit which at times follows its use; the patients rest more comfortably, eat more, and sleep more. And in those who are not in a stage of disease refractory to any form of treatment, a remission has come on more often when transfusion has been performed. In one series, analyzed by Bloomfield, remissions occurred in 51 per cent of the transfused patients as compared with 28 per cent of

spontaneous remission in those who were not transfused. The duration and character of the remissions, however, were essentially the same whether induced or spontaneous.

The immediate benefit to be derived from one or more transfusions can be foretold to a certain extent by means of the simpler tests of bone-marrow function briefly mentioned before. Any direct evidences of marrow activity, such as definite increases in the number of reticulated cells, platelets, and polymorphonuclear leucocytes, or any diminution in the degree of hemolysis, which points to a more favorable balance between the factors of blood formation and destruction, augurs well for this mode of therapy. On the other hand, older patients, those with a chronic, prolonged course and those exhibiting signs of marrow exhaustion and excessive hemolysis, often fail to respond well to transfusion.

A point of practical importance which should be emphasized in this connection is the fact that patients with chronic anemia may be harmed more than they are helped by such large transfusions (1000 to 1500 Cc.) as some advocate. This observation has been made clinically by Minot and demonstrated experimentally by Robertson. The explanation for this appears to be that the bone-marrow has adjusted itself to the small number of circulating erythrocytes, and the injection of a large bulk of blood may produce a serious depression of the already relatively inactive marrow. In such cases, multiple small transfusions would probably be more desirable than a single large one.

Concerning the ultimate effect of transfusion upon the prolongation of life in pernicious anemia, no definite data are available. From the very careful statistical study of Bloomfield, although based upon a small series of cases, it would appear that transfusion brought about no appreciable increase in the duration of the life of these patients. This observer was able to trace seventeen of twenty-six patients who had received transfusions of blood varying in number from one to seventeen. Thirteen of these were dead and four were alive, the symptoms in the latter having been present one, two, two, and four years, respectively. Patients treated by the older general methods, however, may also live for a period of four years or longer. Thus Cabot, in an analysis of 647 cases, found 79 patients who lived four years. Transfusion, therefore, cannot be regarded as more curative in the sense that it modifies the duration of the disease than any of the older and simpler modes of treatment.

Although splenectomy for pernicious anemia has been practiced for almost a decade, and has already been abandoned in some of the best clinics of this country, it is well to emphasize that we possess as yet only meager data concerning the effect of this procedure upon the prolongation of life. Its immediate beneficial effects in selected cases cannot be doubted. In patients with clinically enlarged spleens, icteroid appearance, signs of hemolysis, and evidences of active bone-marrow, the results of splenectomy have been remarkably favorable. Splenectomy in such instances not only reduces the red cell destruction as may be clinically shown by the various tests, but it also brings about, by some unknown mechanism, an increased activity of the bone-marrow, with a rise of the reticulated red blood cells, platelets, and polymorphonuclear leucocytes. Beneficial results cannot be expected, however, in patients with an aplastic or an exhausted bone-marrow. When one compares, however, the actual results obtained with the possible results if operation had not been undertaken, the argument for the early employment of splenectomy becomes decidedly weaker. Thus, whereas removal of the spleen may cause a quick and marked improvement in from 64 per cent (Krumbhaar) to 70 to 78 per cent (Minot, Giffin) of the cases, natural remissions occurred one time or another in over 80 per cent of the patients of Cabot's series treated by the older conservative methods.

If, then, splenectomy merely induces a remission, and this is at present the opinion

of the majority of observers, it should be logical to undertake it only as a last resort, when all other measures have proved unavailing, and perhaps with the hope of prolonging life. That the duration of life of splenectomized pernicious anemia patients may actually be lengthened has been very recently shown by Giffin in a statistical survey of the patients observed in the Mayo clinic. In a study of the postoperative life of fifty patients operated upon more than three years ago, Giffin found that ten patients (21.3 per cent) of those who recovered from the operation survived splenectomy three years or longer, and that five patients (10.6 per cent) have survived splenectomy more than five and one-half years and were still living at the time of the report in January, 1921. The total length of the history of these five patients averages about six years, which is clearly longer than the average expectation of life of pernicious anemia patients (four years, Cabot). So that it may be said with reasonable accuracy that, in addition to the immediate remission which occurs with considerable constancy following splenectomy, splenectomy prolongs life in at least 20 per cent of the cases. The hopefulness of this outlook is still further increased by the gradual reduction in the operative mortality from 20 per cent (Krumbhaar, 1917) to 6 per cent (Giffin, 1921).

Pneumo-peritoneal Roentgen-ray Diagnosis.

STEIN and STEWART, in the *New York State Journal of Medicine* for July, 1921, state that much interest has recently centered around the employment of pneumoperitoneum with roentgenography, as a means of visualizing the contents of the abdominal cavity. This method consists in artificial inflation of the peritoneal cavity, preferably with a definite gas or mixture of gases, preparatory to making the Roentgen examination. The safety and harmlessness of the procedure in skilled hands are so universally admitted as to render it superfluous to dwell upon these features, which are naturally essential to the applicability of any diagnostic procedure. As shown by their own observations in nearly one hundred and seventy-five examined cases, and confirmed by the experience of other observers, no untoward results of any kind detract from the value of this simple but highly efficient diagnostic procedure, which has already stood the test of time, and while extremely easy of application, has been found greatly superior to all other methods of examination for the recognition of intra-abdominal lesions of all kinds, especially those involving the solid organs. It is the only method capable of determining the extent of adhesions between the viscera and the abdominal coverings as well as the contents of herniated abdominal walls.

Induced pneumo-peritoneum is equally serviceable for the early diagnosis of peritoneal tuberculosis and for the recognition of the extent of the disease. Localization of projectiles in and beneath the diaphragm is rendered comparatively simple. In fact any subdiaphragmatic lesion can usually be cleared up by this method. It offers good prospects for rendering a positive diagnosis in diseases of the liver and gall-bladder, where the customary methods of clinical and physical examination are often found insufficient. We are now able in many cases to show pathological enlargements, deformities and adhesions of the gall-bladder. Not only that, but in a number of cases they have shown clearly and distinctly large single stones as well as innumerable small stones.

Retroperitoneal growths can also be clearly outlined. An enlarged spleen which has escaped detection through palpation can often be recognized, and changes in the position of the organ be ascertained by means of induced pneumo-peritoneum and roentgenography. Remarkably clear and distinct roentgenograms of the kidney have been obtained with the assistance of artificial inflation of the peritoneal cavity, which also affords accurate information as regards the size and shape of the organ,

besides indicating the type and degree of renal motility. Although the condition of the female pelvic organs can be more or less satisfactorily ascertained by means of the older methods, in the majority of cases peritoneal inflation with *x*-ray examination will probably find an application also in the domain of gynecological diagnosis, in deeply situated abdominal neoplasms. Its constantly increasing range of applicability is characteristic of the method.

As to actual contraindications, the existence of acute abdominal conditions such as acute appendicitis or peritonitis naturally prohibits the employment of the method of abdominal inflation. Nor should this procedure be carried out in known cases of valvular disease of the heart, for more work is required of this organ when the abdomen is inflated than under ordinary conditions. Their experience has shown that a certain type of elderly persons, notably men who have used alcohol in excess, does not readily lend itself to the employment of this method. On the other hand, the average man, woman or child is a perfectly satisfactory subject, and with the adoption of the deflation method the performance of entirely painless inflations will soon become the rule.

In the present simplified technique for the application of pneumo-peritoneal Roentgen examinations, the only accessories required are an ordinary lumbar puncture needle, two sections of small rubber tubing, each measuring about three feet in length, a rubber bag with a capacity of about four liters (such as is used with the gas-oxygen anesthesia apparatus), and a tank containing the gas which one intends to use. One section of the tubing is connected, one end to the tank and the other to the intake of the bag. The second section of tubing is thoroughly sterilized and connected to the outlet of the bag; the apparatus is then ready for application.

The patient is prepared as for any Roentgen examination, by a thorough cleaning out of the bowels and emptying of the bladder just before the inflation. The administration of one-quarter of a grain of morphine fifteen minutes before the induction of pneumo-peritoneum is recommended for the simple reason that it dulls the edge of any pain which may arise when the abdomen is distended to its full capacity. In many cases it is not necessary at all, but it is of great help in others, its degree of usefulness varying with the individual temperament.

The needle (properly sterilized) is inserted about one to three fingerbreadths below the umbilicus in the median line. The skin in this vicinity is thoroughly cleansed with tincture of iodine. Existing scars are to be avoided when inserting the needle; a location should be selected where it is reasonable to expect that no adhesions will be encountered. They have found that a local anesthetic before introducing the needle is entirely unnecessary; merely taking a fold of the skin tightly between the fingers is sufficient to counteract any pain on introduction. The needle should be slowly inserted as far as the fascia—the thickness of the abdominal wall being easily gauged by any surgeon, a gentle pressure will then ease it through the fascia and peritoneum into the abdominal cavity. The needle is then connected to the free end of the rubber tube attached to the outlet of the bag, which has been previously filled with the selected gas, a stop-cock at the outlet of the bag is turned on and the gas allowed to slowly pass into the peritoneal cavity—gentle pressure on the bag will sometimes be necessary in order to force in the required amount.

The bag fulfils two purposes: First, it allows full expansion of the gas before introduction into the peritoneal cavity; and second, the gas, having fully expanded, soon assumes the temperature of the surrounding air and becomes more or less warm before insufflated, which is very desirable, although they have never felt the necessity of using any special warming apparatus, nor have they used any method of filtration or sterilization of the gas, believing the less complicated the method the less

danger of infection. So far they seem justified in their contention, having used the method in nearly one hundred and seventy-five cases without any untoward effect.

The question of whether the point of the needle is within the peritoneal cavity is interesting; some authors recommend the injection of a small amount of saline solution, others watch the inflation under the fluoroscope. They have depended more on the tactile sense of the surgeon, who rarely fails to know whether he has entered the peritoneal cavity or not; if there be any question, gentle pressure with fingers is made around the needle, and with the ear near the anterior abdominal wall a slight roar can be heard as the gas enters the abdomen. It is important that this question be decided before much gas is allowed to flow as an emphysema in the extraperitoneal structures interferes with good Roentgen detail. If the abdominal walls are relaxed, one can "catch up" a fold while introducing the needle; this assists not only the passing of the needle, but raises the parietal peritoneum away from the intestines and there is less danger of puncture than otherwise.

The quantity of gas used depends largely upon the condition of the anterior wall; if there is much relaxation one must use considerable, usually four liters. If one is dealing with a young subject with a firm abdominal wall, about two liters are sufficient. The essential feature is to obtain a moderate distention so that the abdomen is distinctly dome-shaped and the anterior abdominal wall about as tense as the head of a drum. The required amount of gas having been insufflated, the tube is disconnected, the needle quickly withdrawn, and the site of the puncture covered with a small piece of adhesive plaster. The entire method is strictly surgical and should be attempted only by one with surgical experience. The procedure is conducted throughout under modern aseptic precautions.

In selecting the gas to be used, one is influenced by the character of the Roentgen examination required. If, for instance, the case is one calling for only an examination of the liver and gall-bladder region, or in fact any case requiring a short *x*-ray examination, carbon dioxide is the best, as it will be absorbed in about twenty minutes. It is ideal where quick *x*-ray work can be accomplished, the advantage being that the abdominal tension will have disappeared before the effects of the morphine have worn off. For more lengthy examination, they have successfully used a gas consisting of two parts of CO_2 mixed with one part of oxygen; this is usually absorbed in about thirty-five to forty minutes. For Roentgen examination of the entire abdominal contents, pure oxygen is used; this gas is not absorbed rapidly and gives ample time for investigation, both fluoroscopic as well as roentgenographic, and after the roentgenographic examination the needle can be reinserted and the abdomen deflated.

They have never felt it advisable to leave the needle *in situ* where oxygen has been used, as more danger could be expected from such a procedure than from reinsertion. The Roentgen examination requires the patient to be placed in so many different positions that a retained needle would be more liable to traumatize the peritoneum, if not occasion a puncture of the intestines.

Intestinal Tuberculosis.

BROWN and SAMPSON, in the *New York State Journal of Medicine* for July, 1921, state that when diarrhea is absent, medicines are of little avail. Drop doses of creosote in a capsule, with one-quarter grain iodoform, may be tried after meals. Salol and Tully powder, 2.5 grains of each, every four hours, may have to be resorted to in terminal cases.

The *x*-ray may not reveal the whole extent of the involvement. Patients with advanced pulmonary tuberculosis do not do well and should not be operated upon, nor should those with advanced intestinal lesions, except to relieve symptoms. In early localized cases, excision is the operation of choice, but it may be necessary to

short-circuit, which in advanced cases may make the condition and symptoms worse.

Treatment by sunlight or the mercury quartz lamp often relieves the symptoms in a striking way and produces both clinical and radiological changes that are remarkable, but inasmuch as a few cases recover without any treatment, judgment of the value of this treatment is difficult, and these results may not be attributed entirely to the ultraviolet ray. These methods should be used in all cases whether or not subjected to operation.

Diagnosis and Treatment of Diphtheria.

In the *Lancet* of July 9, 1921, THOMSON touches upon the main points in the treatment of acute diphtheria; apart from suitable nourishment, these are adequate dosage of antitoxin and complete rest in the recumbent position. All other treatment falls into insignificance beside them, and any treatment which interferes with them is bad. We know that within a certain time antitoxin will stop the production of toxin, but we cannot say just how long that time may be; possibly it varies in different individuals and in different degrees of severity. There is evidence which goes to show that antitoxin neutralizes or partly neutralizes the toxin in circulation, and that larger doses may partly neutralize toxin loosely combined with the cells, but not that which has become fixed. We do not know at all exactly when the toxin commences to be circulated in quantity; we do not know how long it is in circulation or how long it is loosely combined. The deductions appear to be that the earlier one can treat the disease the better, and that if one fails to get the patient early the dosage should be greater; this is in accord with clinical experience.

At one time it was laid down, and, indeed, is still held by some, that the weight of the individual should regulate the dose. This at first sight seems reasonable, but the child is more susceptible to diphtheria than the adult, and the net result is that the child requires as large a dose as the adult. It is true that infants are often insusceptible or less susceptible to diphtheria, but that point can hardly be held to affect the general rule of dosage. The method of administering the antitoxin affects the dosage to some extent, but the main points affecting it are the severity of the attack and the stage of the disease. It is, however, very difficult to estimate the dosage in any given case, and the only safe method appears to be to err purposely on the ample side.

To arrive at the approximate dose one has to be guided by the stage of the disease, the rapidity of progress from the onset of the symptoms, the amount of membrane, the amount of inflammation and edema, the amount of glandular swelling, the amount of cellular infiltration; whether the nasopharynx is involved, as indicated by nasal discharge; the character and amount of the nasal discharge, and whether is is blood-stained; whether there is bleeding from the mucous membranes, and to what extent; whether there is hemorrhage into the skin, and whether there are subcutaneous hemorrhages; whether the larynx is affected as well, and the throat fetor. One must not be guided by the amount of membrane alone, as sometimes happens; Thomson points out that early in the most serious cases there may often be no membrane. Having thus arrived at the probable dosage it is wise in all severe cases to add, say, 4000 units more to cover possible error.

The accepted methods of administration are the subcutaneous, the intramuscular, and intravenous. The intravenous method, while having its advantages, need hardly be considered for routine purposes. Rolleston advises the intramuscular chiefly because the absorption is more rapid than by the subcutaneous method. In his opinion, also, the intramuscular method is preferable and the injection is best made deeply into the vastus externus. Some inject into the gluteal region, but as Rolleston points out the thigh muscles are more compact and exercise greater pressure and so help the more rapid absorption of the injected fluid.

Further, it is to be remembered that the patient has to lie on the gluteal region, and there is no need to add to his discomfort.

Rolleston advises the following dosage: For severe faucial cases: 16,000 to 20,000 units, and a similar or sometimes smaller dose on one or two of the following days. For moderate faucial cases: 8000 to 12,000 units, occasionally repeated on the following day. For mild faucial cases: 4000 to 8000 units, repetition rarely being necessary. For nasal, laryngeal, conjunctival or aural diphtheria in which there is no faucial involvement: 4000 to 12,000 units.

Ker states that in diphtheria cases are frequently met with in which a single dose of 10,000 units is not enough, and that in not a few cases there is no improvement until the patient has received more than 20,000 units. Further, he says that in severe nasopharyngeal cases it may be necessary to give 40,000 units or more. He believes that for some mild faucial cases 4000 units is sufficient, but there is the difficulty in gauging the class of case one is dealing with. This can be done with some accuracy by those of much experience, but is very difficult for others. Personally, Ker does not care to give less than 6000 units, and he advises all those who are uncertain that the case is really a mild attack never to give less than 8000 units.

It is well to remember that we do not know very much about the accurate dosage of antitoxin; but we do know the patient will recover if an adequate dose of antitoxin is given sufficiently early in the disease. Thomson refers to the wonderfully good results obtained by MacCombie amongst patients treated on the first day of the disease; he believes that he never gave less than 12,000 units. It is impossible to say what the maximum necessary dosage is in the most severe cases. He has seen cases in which more than 50,000 units seemed necessary. Ideally the amount of antitoxin necessary should be administered in one dose, but it is very difficult to estimate the quantity and so second doses are often required. It is desirable that the second dose should be given not later than twenty-four hours after the first; repeated doses extending over a few days are not to be recommended.

If one has not erred in one's estimate of the severity of the attack, as indicated by a definite increase in symptoms in twelve hours after the injection, many cases will not require more antitoxin. In mild faucial cases second doses will seldom be necessary. In moderate faucial cases some will require second doses of from 8000 to 10,000 units. In severe faucial and severe faucial and laryngeal second doses of from 12,000 to 16,000 units will be required in a goodly number.

In many very severe faucial cases second doses, usually varying from 16,000 to 20,000 units, will be required, but occasionally it will be advisable to repeat the first-day dose in twenty-four hours or less if the faucial swelling and cellulitis have increased, and to give a second dose of 20,000 units should there be no improvement by that time. Cases suffering from laryngeal diphtheria with no faucial or nasal involvement seldom require more than 18,000 units. Nasal diphtheria with membrane but no faucial involvement, and conjunctival diphtheria with no faucial involvement, seldom require a second dose. A discharge from the nose, whether blood-stained or not, in which is found the diphtheria bacillus but no membrane formation, seldom requires antitoxin treatment.

[We think it is safer to use antitoxin in these nasal cases.—ED.]

The Capillary Pressure and the Circulation in Shock.

HILL and MCQUEEN, in the *Lancet* of July 9, 1921, remind us that Hill has demonstrated the fact that the capillary channels in the body are never all filled. If an armlet be placed on the upper arm and pressure applied just below the systolic level the large veins of the arm below the armlet will rapidly rise to the systolic level of pressure pertaining in the brachial artery

while the capillary pressure is still much lower than systolic pressure. Hill deduced from this experiment that (1) the capillaries that have blood in them are capable of taking up much more blood by dilatation; (2) there are numerous capillaries in the body not filled at all; (3) there are anastomotic channels whereby pressure is easily and quickly transmitted between small arteries and the veins.

All of these conclusions have been amply proved. Bayliss found that after section of the spinal cord large volumes of gum saline solutions could be injected and remain in the vessels with persistent dilution of the hemoglobin; evidently here capillaries distend and formerly closed capillary channels open. The capillary field becomes a huge reservoir of diluted blood. Hill finds that direct anastomotic paths between small arteries and veins are visible on examination of capillary fields. It has been repeatedly noted in cases of shock that the red blood cells in venous blood taken from the arm often numbered 2,000,000 corpuscles fewer per c.mm. than in blood taken from the capillaries. In the old view of the circulation of the blood passing by way of arterioles through capillaries into venules and veins it is obvious that the venous counts and capillary counts should agree closely. But if, as Hill has long maintained, and now shown by examination of capillary fields under the microscope, there are these short and direct paths between arteries and veins, we should expect that the high red-cell count pertaining in these capillary areas in which there is slow flow or stasis would not obtain in the direct paths through which arterial blood flows with its lower red-cell concentration, hence the venous counts would be uniformly lower than the capillary counts. It is noted that as shock diminishes the capillary and venous red-cell counts approximate in value. In normal individuals greater differences than 3 per cent between capillary and venous counts did not exist. It is obvious here that in these anastomotic paths we have the factor on which depends the possibility of restoring stagnant blood in the capillary area into circulation. If no such anastomotic paths existed the slowing of the blood current in the capillary area would uniformly lead to concentration so great that little or no blood would be in circulation at all.

Surgical shock would kill with an effect and rapidity similar to anaphylaxis in the guinea-pig; or injection of histamine in the etherized cat, when the blood in the capillaries and veins ceases to flow, as can be observed under the microscope. In surgical shock blood slowly concentrates in the capillary area, and the return blood to the heart is a mixture of blood of more normal concentration passing by the direct anastomotic channels and concentrated blood returned from the capillaries to the veins. The phenomena of shock supervene gradually and the removal of shock is equally gradual; viscosity of the blood in the capillaries may be overcome by dilution with other blood (donors) or gum-saline mixtures and the pressure in the arterial tree raised through the injection; both factors tend to remove stagnation. The blood diluted with donor's blood or gum saline has the easy path of return to the heart via anastomotic channels, and is not compelled, all of it, to force its way through capillaries that are already choked with concentrated blood. The approximation of venous red-cell and capillary red-cell counts is correctly interpreted as proof of the removal of stasis. But if there were not in existence these free anastomotic paths it is extremely doubtful if such removal of stasis could take place. The primary cause of the capillary stasis is the fall of the arterial blood-pressure below the critical level of 80 mm. of Hg or so, and the fact that the fall is not temporary as in the case of fainting. Whether in shock the products absorbed from damaged tissues or the sensory stimulation preceding it is the cause of this prolonged fall in the arterial blood-pressure below the critical level we cannot judge on the available data. However, the fact that with a normal arterial systolic pressure of 130 mm. of Hg the kinetic energy of

capillary blood flow is but a fraction of a few millimeters means that this fraction becomes less with a falling blood-pressure, and may be still less with a general vasoconstriction in the arteriole area. The general capillary field is sacrificed to the arterial pressure in the brain and in the heart, and a sure Nemesis awaits that method of restoring blood-pressure if carried too far. Deoxygenation sets in in the capillary area, the osmotic pressure of the tissue cells rises and these imbibe more fluid, the capillary wall may suffer and become increasingly permeable. The viscosity of the concentrated blood increases. The kinetic pressure available in the capillary area, already a small fraction of a few millimeters of Hg, is inadequate to maintain the blood flow, and the heart, so carefully shielded from oxygen want by vasoconstriction elsewhere, finds itself with progressively less and less blood to propel.

The value of gum-saline solutions or of normal blood from a donor is obviously due to the fact that the heart is fed directly from the vein into which the solution is run. The pressure rising in the main arterial system is transmitted to the capillary area, but the gum-saline with its viscosity equal to normal blood, or the donor's normal blood, dilutes the concentrated blood in the capillary area, restores it to a more normal viscosity, reoxygenizes the tissue cells and the capillary wall, and prevents the increasing loss of fluid by imbibition and permeation.

In shock when the blood-pressure falls below 80 mm. Hg it is possible, as pointed out by MacLeod, that the reciprocal innervation, by means of which vasoconstriction in one area is compensated by vasodilatation in another, acts in a faulty manner. It is possible that a profound general vasodilatation occurs in the initial stages, but such vasodilatation, while it lowers the general level of arterial blood-pressure, might not decrease the kinetic energy of the blood flow in the capillaries. But when arterial vasoconstriction sets in later, and blood is trapped in distended capillaries, and capillaries open that formerly were shut, then the kinetic energy of the capillary flow becomes altogether insufficient to propel the blood.

The accurate measurement of capillary blood-pressure then throws light on stasis. Low arterial blood-pressures are dangerous because the capillary kinetic energy of blood flow is very small even with normal arterial blood-pressure. There is a very small margin of safety in the capillary area.

The Law of the Heart.

STARLING, in the *Lancet* of July 23, 1921, states that by a careful observation of the changes in the heart we may arrive at some clue to the nature of the pressure, but more accurate methods are necessary if we are to be certain of the correctness of our guess. We must under these varying conditions measure: (1) the pressure in the heart cavities produced at each contraction; (2) the volume of the heart cavities—*i.e.*, the length of the muscle fibers of their walls. The first he measured in the experiment described by connecting the interior of each cavity in turn with a quickly acting manometer, the excursions of which are registered by an optical method so as to avoid the instrumental vibrations of a lever. The curve of pressure obtained under two conditions—*i.e.*, low and high artificial resistance—could then be plotted. It must be remembered that the heart was sending on in each case all the blood that it received, though the work necessary under the high pressure was two or three times as great as that necessary to send on the blood at the low pressure. To measure the volume of the heart the ventricles are enclosed in an instrument known as a cardiometer. This communicates with a piston recorder, so that the change of the volume of the ventricles at each beat can be registered on a moving surface.

The question to be decided is, how does the heart know when it is relaxed that at the next contraction it will have to exert more force than it did previously, when the

arterial resistance to be overcome was lower? If we measure the pressure in the ventricles in the manner just described we find that during the period of relaxation of the ventricles the pressure in its cavities is approximately zero, whether the artificial pressure which it has to overcome at its next beat is 50 or 150 mm. Hg. It is not, therefore, the tension on the walls of the heart which determines the strength of its contraction at its next beat. When, however, we come to measure the volume of the heart, we find that in the isolated heart this is directly proportioned to the work which the heart has to accomplish. Thus we find that the larger the heart—*i.e.*, the more it is dilated during diastole—the greater is the pressure that it will get up at the succeeding contraction or systole.

This may be put in another form, as is shown by continuing the experiment over several hours, when it is found that the worse the condition of the heart muscle, the more it must dilate in order to get up an adequate pressure. Other things remaining equal we thus see that the volume of the heart during diastole is a measure of its physiological condition, and we are not surprised that a failing heart means a dilated heart. Of course, there is a limit to this power of adaptation. As the heart dilates it is working at an ever-increasing mechanical disadvantage, and a point will finally arise at which this disadvantage more than counterbalances the physiological effect of dilatation. The heart then dilates widely and fails to empty its contents. Dilatation of the heart means elongation of the muscular fibers composing its walls; so that we may put the law of the heart in another way and say that the longer its muscle fibers the greater is the energy developed at each contraction. But in this form this wonderful power of adaptation possessed by the heart becomes part of the general properties of all muscular tissues, since the same rule applies to the fibers composing our voluntary muscles.

Can we obtain any more precise and physiological conception of what is involved in this relationship between length of fiber and strength of contraction? Microscopic examination of the fibers, either of the heart or of voluntary muscles, shows that these are composed of innumerable fibrils, so that internally the muscle fiber is made up of structures presenting an enormous extension of longitudinal surfaces. The more the muscle is stretched the greater will be the extent of these surfaces. A large amount of evidence, based on the electrical and chemical changes occurring in muscle as a result of excitation, points to the contraction as being essentially a surface phenomenon—a molecular change over the whole of the longitudinal surface which may result in a polarization or depolarization of its service and an increase of its surface tension, so that the muscle is a surface tension machine in which there is on excitation a direct conversion of chemical into surface energy. The greater the surface the greater will be the number of molecules involved, so that increased length of muscle must increase at the same time the total chemical changes and the total tension produced by the summation of the surface tension of each fibril.

It is only by such a change of molecular dimensions that we can explain the rapidity of events in a muscle (the insect wing muscle can contract and relax 300 times per second), or the high efficiency of the machine, an efficiency which A. V. Hill has shown may amount to 100 per cent for each isolated contraction, and over a length of time to 50 per cent.

Prolonged Intolerance to Carbohydrates.

HOWLAND, in the *Archives of Pediatrics* for July, 1921, states that it is now generally appreciated that sugars initiate and perpetuate diarrhea and are capable of doing a great amount of harm. Many children with a prolonged sugar intolerance have a tendency to diarrhea even when taking woman's milk. It is apparently the sugar and not the fat that is responsible, as is suggested by a diet deficient in carbo-

hydrates, which is borne even though it may contain a considerable proportion of fat. The disturbance in such patients is usually attributed to something else than the peculiarity of the individual. A more important condition is the prolonged intolerance that develops after severe diarrhea, especially after numerous attacks of diarrhea. The first indication here is to reduce the sugar to its lowest limits in a food which furnishes the other requirements for adequate nutrition. Nothing can compare with protein milk in this respect. It allows the presence of fat, protein and salts with minimum of disturbing sugar, and it furnishes the substances necessary for the formation of insoluble soaps.

Carbohydrates must be withheld for a long time. A polysaccharide, such as farina, is not only at times well borne but may even have a marked constipating effect. Young infants will usually not tolerate this. With older infants it may be strikingly successful. These forms of carbohydrate intolerance are confined almost entirely to the first two years. Another form, perhaps the most striking and certainly the most persistent, occurs in children of all ages. It is commonly known as chronic indigestion or as intestinal infantilism of Herter. Theories as to the causation of this condition are hard to substantiate. At present we may theorize but not prove.

One may speak of the treatment with more assurance. It has been found that of all the elements of food carbohydrate is the one that must be rigorously excluded. The dietary treatment may be divided into three stages. First, that with protein milk alone. From experience with more than 30 such patients it can be said that, more than any other food, this is likely to bring satisfactory results. It is preferable to buttermilk on account of its somewhat higher caloric value, and especially because of its far lower sugar content. How long the protein milk stage should be continued depends upon the intestinal reaction and somewhat upon the age of the child, but usually is a matter of days or a few weeks. It should be continued until the stools are firm, distention very slight, gas not in excess, and appetite good. The diet in the second stage consists of protein milk as a basis reënforced by almost pure protein foods. These may include curd without any whey, scraped meat, certain forms of cheese, egg-white, and eventually whole egg. The duration of this stage is many months; it may be years.

This is not an ideal diet, but it is an adequate diet. A child may take such a diet for a long time with nothing but benefit and with a continued gain in weight. With this diet there is enough sugar to guard against acidosis and no danger of lack of vitamines. Vitamine A is supplied by the fat of protein milk, which is for this reason to be preferred to buttermilk. Vitamine B is supplied by the whey of the buttermilk, and the antiscorbutic factor can be given in the form of orange juice or tomato juice. In the third stage carbohydrates are added very gradually, with most careful observation of the digestive capacity. Bread, cereal and potato are the last articles that can be allowed. The treatment is time-consuming, but these patients well repay the effort expended upon them. They do not remain invalids, but become vigorous and strong.

Psychotherapy of Tuberculosis.

NEALE, in the *Pennsylvania Medical Journal* for July, 1921, states that we should not be discouraged if the patient loses heart, but start again on new lines; keeping always before the patient the probability of recovery. The opinion of the patient should not be disregarded but listened to, and gradually, if possible, one can create new ideas if the ones he has seem pernicious. His character and his way of reasoning is to be studied. If he is taciturn and gloomy, give him something to think about that will lead his thoughts into some other field of speculation, and if he has a fixed idea as to the efficacy of some plan of treatment, allow him to believe that it will be put into effect when the proper time comes.

In concluding his article Neale says that of late years it seems to him we have been growing altogether too scientific (or think we are), too much given to the belief that medicine is a positive science and that all diseases can be reduced to an absolute scientific certainty, in diagnosis, prognosis, and treatment, if we are only sufficiently scientific to carry out these deductions in a strictly up-to-date manner. We are practically told all this by the so-called leaders in modern medicine, but he is sufficiently old-fashioned to be not quite certain of that fact, and like the man from Missouri he "wants to be shown." There can be no mathematical calculation in this question; too much depends upon factors not seen or thoroughly understood. Too much science and too little common sense often lead us far afield, and as not one of the many books upon psychotherapy makes clear the method of application of these principles, it is hardly to be expected that one can point out any positive course to follow that will suit every individual. It seems to Neale a question for any one who recognizes the value of psychotherapy to apply in his own way. We all use it, more often unconsciously than otherwise; but if he has awakened sufficient interest to lead others to attempt to follow out treatment along these lines he is content. Once understood and put into practice, often the most surprising and gratifying results will be observed.

The Clinical Value of Intraperitoneal Injections of Salt Solution.

GITTINGS and DONNELLY, in the *Archives of Pediatrics* for July, 1921, state that in the treatment of dehydration seen so frequently in children suffering from gastro-intestinal disorders with diarrhea during the summer months they had found that the most efficacious means of introducing fluid was by the use of the nasal tube, or by intraperitoneal injections. The other methods were either too painful or allowed the introduction of insufficient amounts of water. The intravenous route possesses certain dangers and might well be reserved for the introduction of solutions of glucose or glucose acacia. The nasal tube was preferable to the stomach tube, as being less likely to cause vomiting. It should only be introduced well beyond the epiglottis and not through the cardia. This also seemed to be less apt to cause regurgitation. From 150 to 250 Cc. of water could be introduced two or three times in twenty-four hours, from three to three and a half hours after the last feeding. Intraperitoneal injections seemed to be safe provided the bladder was empty, the abdomen was not distended, and the fluid was introduced slowly. The amounts to be used vary usually from 150 to 300 Cc., the optimum to be judged by the subjective and objective symptoms. Disturbance of respiration and pulse and increasing distention indicate withdrawal of the needle. One hundred and sixteen patients received 352 intraperitoneal injections of normal saline. Comparison with the mortality showed that the oldest cases and those having the highest weight on admission had the greatest proportion of recoveries. The mortality increased *pari passu* with the number of injections, being the highest in those receiving ten or more. Dehydration was determined upon the degree of the loss of resiliency in the skin and subcutaneous tissues, when pinched into a fold.

According to this criterion those with the least resiliency showed the highest mortality, and *vice versa,* although in some cases the dehydration was entirely relieved without preventing the fatal issue. Autopsy upon nine of the patients showed that no injury had been done to the peritoneum or any of the abdominal structures. The authors concluded that the forced ingestion of water by nasal tube deserved a more extensive trial; that 300 Cc. probably represented a maximum for intraperitoneal injection in any infant under one year of age, and that smaller amounts administered more frequently were safer for infants weighing less than 4000 grammes.

Route of Administration of Drugs in Relation to Toxicity in Chemotherapeutic Investigations, with Special Reference to Intrapleural Injections of Ethylhydrocuprein Hydrochloride.

KOLMER, in the *Journal of Pharmacology and Experimental Therapeutics* for July, 1921, summarizes his article as follows:

1. Ethylhydrocuprein hydrochloride, other quinine compounds, mercurophen, arsphenamine and neoarsphenamine are 0.6 to 0.7 times more toxic for white rats by intrapleural than by intravenous injection.

2. Ethylhydrocuprein hydrochloride and mercurophen were about 7 to 8 times more toxic for rabbits by subthecal injection than for white rats by intravenous injection.

3. Ethylhydrocuprein hydrochloride, other quinine compounds and mercurophen were 3 to 4 times less toxic for white rats by intraperitoneal injection than by intravenous injection; arsphenamine and neoarsphenamine were 1 to 2 times less toxic.

4. Ethylhydrocuprein hydrochloride, other quinine compounds and mercurophen were 10 to 16 times less toxic for white rats by subcutaneous injection than by intravenous injection; arsphenamine was 2 times less toxic, but neoarsphenamine was 0.5 to 1 time more toxic.

5. The toxicity of ethylhydrocuprein hydrochloride by intravenous injection to mice, rats, guinea-pigs and rabbits was quite uniform, the highest tolerated doses being 0.03 to 0.04 gramme per kilogramme of weight. Toxicity by subcutaneous injection varied from 0.500 gramme per kilogramme in the guinea-pig to 0.600 gramme per kilogramme in the mouse and rabbit.

6. The toxicity of arsphenamine and neoarsphenamine by intravenous and subcutaneous injection varies with the test animal, the highest tolerated doses being observed with mice, next with rats and rabbits in the order named.

7. There is no constant or uniform relation among the highest tolerated doses of different compounds for animals of the same species with the same route of administration. In very general terms a compound is apt to be about 8 times more toxic by subthecal than by intravenous injection; 0.6 to 0.7 times more toxic by intrapleural, 1 to 4 times less toxic by intraperitoneal, and 2 to 16 times less toxic by subcutaneous than by intravenous injection.

Needed Measures for the Prevention of Deafness During Early Life.

In the *Journal of the American Medical Association* for July, 1921, HAYS states that the vast amount of harm that is done to ears during the exanthematous diseases, particularly measles and scarlet fever and meningitis, has seemed to be fully recognized. The ears of the children are well taken care of during the acute stages of the disease, and remedial measures are at once used. But what happens after the acute condition subsides? How many of these cases are properly followed up after the patient leaves the hospital? Yet if one glances over his histories of progressive deafness later on in life, he finds that frequently there is a history of the trouble having arisen during or after one of these three diseases.

Meningitis with deafness often means that the nerve has become affected or that there has been some intracranial affection, and the condition frequently manifests itself at the time of the disease and so is given hopeless attention. But in scarlet fever and in measles there is either a residual process left or there is a continuation of the catarrhal process which forms part of the disease. The acute inflammation has subsided or the suppuration has ceased, and at the time the impairment of hearing is so slight that it passes unnoticed. But certain adhesive processes are left which mean permanent impairment of hearing—processes which he believes could often be remedied, if taken in time. There are some who feel that the hearing defect is caused by toxic processes during the disease; but there are others of us who are convinced that the deafness is due to neglect of the

local trouble after the child leaves the hospital.

Every parent who takes from the hospital a child who has suffered from one of these contagious diseases should be advised to consult an ear specialist at once, and if there is the slightest impairment of hearing, every care should be taken to bring it to normal as soon as possible. Hays has sufficient data on hand to know what can be done in this way, and all of us have sufficient data in our histories of progressively deafened patients to realize that something more should be done for these cases than is done at present.

He indicates the kind of treatment that may be employed to prevent deafness. He has not taken into account the child who has been found to be suffering from slight impairment of hearing by either the teacher, the parent, or himself. A child of school age is usually a sensible child whose hearing can be properly tested and whose ears can be properly treated. There are two factors which are of a great deal of importance in such a case. Invariably such a child has some form of nasopharyngeal obstruction which should be corrected, or else he has been blowing his nose improperly. In former papers he has spoken of pocket-handerchief deafness. This results in a relaxed ear drum, which is an exceedingly difficult condition to treat. Children should be taught to blow their noses properly and not to use them like trumpets. Only one nostril at a time should be held, and if air is felt to force itself into the ear then, the nostrils should not be held at all.

Naturally, in preventive treatment, one must eliminate all causative factors either in the nose, throat, or ear, or in the general system. Next of importance is the proper massage of the drums at regular intervals. The Eustachian tubes of children are far more widely open than they are in adults, and proper politzerization is a simple procedure when one has once gained the confidence of the child. It is amazing to see the vast immediate improvement in the hearing of these children after careful politzerization. A medical vapor should be used in the Politzer bag or the connection between it and the nasal attachment. He has frequently seen hearing, which was zero to the watch before treatment, return to normal after the treatment and remain so for a considerable length of time. The treatment will have to be frequently repeated, particularly after the child has had a severe cold. However, a word of warning should be given here. Too strenuous treatment of children's ears will result in more harm than good. Careful judgment must be exercised in every case. He hesitates to say that he has seen the hearing made worse by overtreatment, but such is the fact. Catheterization is a very difficult and often dangerous procedure in children, and it is wise to feel that a tube which cannot be dilated by inflation through the Politzer bag is a tube which is suffering from a pathologic obstruction which needs more attention than inflation. Aside from the above mentioned procedure, one may make use of a mild massage of the drum by means of a Siegel otoscope or an electric otoscope attached to an electric massage apparatus. The massage should never be given with sufficient severity to cause any engorgement of the drum.

Section of Cervical Sympathetic for Angina Pectoris.

In the correspondence columns of the *British Medical Journal* of July 23, 1921, appears the following note from SIR CLIFFORD ALLBUTT:

"Jonnesco's operation of division of the vagus, mentioned by Starling and others, for the relief of angina pectoris is very interesting to me, as in 1893, at a branch meeting of the Association at Yarmouth, I published my hypothesis that in say 90 per cent of cases the malady was due to aortitis, and that death was due, not to 'heart failure,' but to vagus inhibition—both propositions then made for the first time. Since then I have prescribed atropine —as advised in my book on arterial disease

—to protect the heart from the inhibition. When the heart is sound it escapes from the vagus grip; but in the large majority of the cases the heart is not sound.

"My purpose now is to say that Professor Wenckebach of Vienna wrote to me some months ago to say that he had completed his five-hundredth necropsy on cases of angina, and that he was 'absolutely with me' as to my interpretations of the disease. He added that he had found in many of the severer cases that the vagus in the neck was tender to pressure, sometimes very tender; so much so as to make it desirable that stiff or tight collars should be removed.

"My hypothesis is now widely accepted in France and in the United States, but hardly yet in England. Indeed, a few years ago a dear friend of mine argued with me that it was a 'childish opinion,' and advised me for my own reputation's sake to say no more about it. That nothwithstanding in a small minority of cases the angina arises in or about the heart I set forth and described in my Arteries book."

Surgical and Genito-Urinary Therapeutics

The X-ray After Inflation of the Pelvic Cavity.

PETERSON *(Surgery, Gynecology and Obstetrics,* August, 1921) states that the pelvis has been inflated with gas in over 150 cases with no reaction that could be attributable to the gas itself, or the method employed. He holds there is no danger of injuring the intestines by the needle thrust through the abdominal wall where the intestines are not adherent to the parietes.

There is very little discomfort incident to the procedure. The average patient will complain of discomfort about the lower abdomen when about 400 or 500 Cc. have been introduced, and may complain very bitterly after the introduction of more than 1000 Cc.

Discomfort is increased in the presence of chronic pelvic and abdominal inflammation, also by rapid injection. In half an hour the patients walk about the examining room and leave the hospital without any discomfort. The transuterine route is contraindicated in acute and subacute pelvic conditions. The best results are secured by the moderate knee-chest position, with an inclined board beneath the thighs and a notch cut out for the tubes.

The uterus together with the tubes and ovaries can be clearly shown by pneumoperitoneal roentgenography.

Owing to their distention with gas the tubes are rather more clearly demonstrated by the *x*-ray where inflation has been brought about through the transuterine route than where the inflation has been made transperitoneally.

On account of the rapid absorption of carbon dioxide gas with equally rapid subsidence of the discomfort produced by the inflation, this gas should be used in preference to oxygen, which is very slowly absorbed.

Irregularities of the uterus, omental and bowel adhesions are clearly demonstrated by the pneumoperitoneal *x*-ray.

In not a few instances the diseased and enlarged appendages are more clearly made out by pelvic roentgenography than by the most careful and searching bimanual examination even under anesthesia.

With the improved position (knee-chest and Trendelenburg) smaller and smaller quantities of gas will be necessary for inflation. Thus discomfort will be reduced to a minimum.

If the technique of pelvic roentgenogra-

phy be good, retention of bowel coils in the pelvis will be proof of adhesions.

The pneumoperitoneal *x*-ray is able to demonstrate pregnancy at a much earlier period than is possible by the examining finger.

With good technique and good judgment in the selection of cases both transuterine and transperitoneal gas inflation are free from danger.

Bimanual pelvic examination and pelvic pneumoperitoneal roentgenography are not antagonistic diagnostic methods. Each is valuable, and their value is enhanced if they be used in conjunction, each acting as a check upon the other.

Intussusception.

PERRIN and LINDSAY *(British Journal of Surgery,* July, 1921) contribute a monograph based on 400 cases collected from the London Hospital records of admissions during the eighteen years from 1903 to 1920. Only the first seven cases admitted during 1920 have been included.

In seven cases no operation was performed, and these all died. In 309 cases of laparotomy with reduction 22 plus per cent died. In 29 cases of resection with anastomosis by clamps 68.9 per cent died. Laparotomy, attempted reduction or anastomosis, sewn up—all died. Resection with Paul's tube—all died. Resection with Murphy's button—all died. A similar result followed with Paul's tube alone and with no operation.

As a rule after reduction convalescence was rapid and uneventful. In the whole period of eighteen years there were 400 cases, with 139 deaths, giving a mortality of 34.75 per cent.

A gratifying feature of the mortality is that beginning with a death-rate of 56.7 per cent in 1903 to 1905, this steadily fell to 17.9 per cent in 1915-17, and rose again to 39.1 per cent in 1918-20.

From 1903 to 1917 the steady improvement in the statistics is probably due mainly to increase in the number of doctors available for attending the population around the hospital, and possibly also to improved education. It must be remembered that rectal injections as a treatment for intussusception have only ceased to be carried out in the last twenty years, and thus after this date there must have been many practitioners surviving who from early training failed to appreciate the need for early operative intervention. With the passage of time their views would have gradually changed until the present attitude of mind would have been universally reached, in which any child with diarrhea and vomiting is regarded with a suspicious eye as a possible sufferer from an acute intussusception. The regrettable increase in the mortality during the last triennial period, 1918-1920, is probably due to the extensive withdrawal of doctors for the army during the latter part of 1917 and early months of 1918. This has probably righted itself at the time of writing (December, 1920), but the more favorable statistics of 1920 have not made themselves felt, for they are not completely incorporated in this last triennial period, as only the first seven cases admitted in 1920 are included in the series in order to keep the total number considered at the round figure of 400.

The Present Status of Radium and Roentgen Therapy.

In a leading article in the *International Journal of Surgery,* July, 1921, this question is thus discussed:

Unless the people are fully informed as to the present status of radium treatment in malignant disease, they may gain erroneous impressions that may prejudice them against early resort to radical operation. Undoubtedly much has been accomplished with radium in the removal of the more superficial cancerous lesions of the skin and mucous membranes as evidenced by the numerous complete and permanent cures that have been recorded. It is equally true that it has rendered immense service in inoperable cases of deep-seated carcinoma by

relieving pain, arresting discharge, and prolonging the life of the patient. According to a large number of published observations, advanced cases, in which surgical intervention appears futile, have been so greatly improved under its use as to permit of operation. Notwithstanding all this, it cannot be justly claimed that radium can successfully replace the knife in deep-seated malignant growths which are still within the operable stage. It will, however, prove a most valuable adjunct to surgical intervention, since by its systematic use before and following operation the chances of recurrence are materially diminished.

A question of great practical importance, which is still far from having been definitely settled, is the relative merits of radium and the *x*-ray in the treatment of carcinoma. Each of these agents has advantages of its own. Frequently by their conjoined application better results are secured than by the use of either alone. Where it is necessary to exert an intense and deeply penetrating action over a small area, radium will be given general preference. It can also be applied to internal organs or within cavities which are inaccessible to the *x*-ray or may be buried in the tumor mass. It can be easily carried about and requires no elaborate apparatus. On the other hand, the yield of radium is so limited and its extraction so costly that comparatively few physicians can afford to purchase it. Its use is, therefore, largely restricted to hospitals and other institutions, and many of these have been unable to secure an adequate supply. This difficulty has been overcome to a certain extent by the employment of tubes and other appliances filled with the emanation, but this necessitates the acquisition of large quantities of radium, at least one-half gramme, at a cost which is within the reach of but a small number of private institutions. As has been repeatedly emphasized, to obtain satisfactory results from radium, it must be employed in sufficient quantity, for if used in too small an amount it may stimulate the proliferation of the cancer cells rather than cause their destruction. Furthermore, it cannot be too strongly urged that thorough and extensive experience and a complete mastery of the complicated technique are indispensable requisites in successful radium therapy. Work of this kind should therefore remain in the hands of experts, else serious discredit may be thrown upon this method of treatment.

There is no reason, however, why, in spite of its many advantages, radium should supplant the *x*-ray in the various conditions in which the latter has been found of distinct value. The recent improvements in Roentgen apparatus and in the Coolidge tube warrant the hope that the penetrating power and the intensity of the *x*-ray will be greatly increased, so that it will become possible to subject even deep-seated organs and tumors to the radiations. For many years certain types of uterine fibroids have been successfully treated with the *x*-ray, and in spite of the brilliant successes with radium in more recent years its superiority over Roentgen therapy in this field has not been definitely established. This also applies to the treatment of glandular enlargements, exophthalmic goitre, leucemia, Hodgkin's disease, and various cutaneous affections. In fact, where large surfaces must be submitted to radiations it is probable that the *x*-ray will prove more generally efficient, especially if the supply of radium remains so limited.

Suspension Operation for Varicocele.

KEYES (*International Journal of Surgery*, July, 1921) comments on an operation devised by a former resident, Dr. U. C. Vincent, as follows:

The principle consists in nothing more than the suspension of the testicle by its pampiniform plexus of veins to the external oblique aponeurosis. The object of this suspension is twofold—in the first place the patient likes to see his testicle lifted up higher than its fellow, having usually been greatly distressed to note that it was lower. In the second place many of these patients complain of all sorts of dragging discom-

forts in relation to the testicle, and we have found that this discomfort is relieved by suspending the testicle to the external oblique through its veins, thereby taking all the pull off the vas deferens and surrounding structure.

This is the only operation that actually relieves the discomfort associated with varicocele. The procedure is simple enough. Under local anesthesia a rather short incision is made centering over the external inguinal ring. The veins are identified, their sheath is split, and they are carefully separated. The veins are then divided and the upper end doubly ligated. The lower end is pulled upon, and as it is pulled the fascial adhesions are stripped away from it until the testicle is seen to rise to the upper half of the scrotum. One then estimates how much slack will be needed to hold the testicle close under the pubes, estimating the leaving of it very high in the scrotum, since subsequent to operation the veins will gradually stretch and the testicle sink down at least an inch lower than it is left at the time of operation.

At this point the veins are again cut, and just below the point of cutting transfixed and doubly tied with chromic gut suture. Then with the blunt end of a pair of scissors, or the handle of a knife, the intercolumnar fascia is separated and this blunt instrument run under the aponeurosis of the external oblique for 3 or 4 cm. upward along the inguinal canal, separating the cremaster fascia from the inner surface of the external oblique. Then each end of the ligature that has been used to tie off the lower bit of vein is threaded separately on a needle and run into the inguinal canal and out through the external oblique in such a way that when drawn tight and sutured the veins are pulled up within the canal for the distance of at least an inch. With the tying of this suture the operation is concluded, excepting the sutures necessary to close the skin.

One feature of this operation that is not to be neglected is the fact that it never causes hydrocele.

Fracture of the Skull.

BUTLER (*California State Journal of Medicine*, July, 1921) reports on 280 cases of brain injury diagnosed as fractures of the skull, treated in the San Francisco Emergency Hospital during the year 1920. Of this number 139—to-wit, 50 per cent—of the cases are incident to automobile accidents.

The nearer the pulse and respiratory rates approach the extremes, the more grave the prognosis.

Temperature was normal or subnormal in all cases upon entry.

One hundred and five patients were unconscious upon entry; one hundred and thirty-five were semiconscious, and forty were sufficiently clear to give their names and addresses.

Hemorrhage from the ear or ears was recorded forty-eight times. Discharge of pulped brain material from the external auditory canal was noted in three cases. The progress of cases having hemorrhage from the ears was more favorable than was that of those of apparently equal severity where bleeding was not present.

Nine of the fractures were depressed, and seven of these resulted from falling objects.

Twenty-nine of the two hundred and eighty cases were distinctly alcoholic. Alcohol is more of a factor than these figures would indicate. Frequently the person operating the automobile is intoxicated, but there is no record of it.

All intoxicated persons having head injuries are treated as serious cases and never allowed to leave the hospital, except under the care of a physician.

Head injuries in old people are never to be regarded lightly, even if they may appear very insignificant upon entry. Many lapse into coma, and death may rapidly follow. This may be explained by the inelasticity of the skull and the senile changes in the cerebral vessels.

Location of brain injuries is governed by the force of impact, whether or not the

head is in motion. If the head is in motion and strikes some solid object or material, as telephone pole or pavement, the brain will be injured directly beneath the skull at the point of impact; also a more extensive injury takes place on the opposite side of the brain.

If the head is not in motion and is struck by some moving object, such as a falling brick, the brain injury is located directly below the area of impact.

The most valuable and reliable localizing sign as to the side of compression has been the state of the pupils. The pupil on the side of the beginning compression reacts very sluggishly, often showing a hippus. As compression increases this pupil slowly contracts, reacting at first, later fixed, and finally dilates slowly, followed by the same course of events in the other pupil.

In an extradural hemorrhage from branches of the middle meningeal, with the dura intact, this pupilary phenomenon may take twelve to seventy-two hours, or even longer, to go through the various stages. The reflexes, superficial, deep, and pathological, spasticity and paralysis, are of value, but they are more changeable and unreliable where the injuries are multiple.

In case, for example, having a direct injury in the right parietal-temporal region, with tearing of the anterior or posterior branch of the middle meningeal, and a contrecoup contusion and laceration of the cortex, the reflexes and paralysis would probably indicate the contrecoup injury, but the pupils would give evidence of the increasing extradural clot on the right and, along with properly interpreted *x*-ray, would indicate the location for decompression.

Operation is not indicated: (1) In brain injuries so extensive that all reflexes, superficial and deep, are suspended. (2) When the pulse is above 110, if the rapid rate is due to shock alone; given time it will slow down and then decompression may be performed, if indicated; if due to destruction of brain the pulse continues to become more rapid, and any operative interference would only hasten the end. (3) When all the signs of compression develop very rapidly, for example, in thirty minutes to one hour. (4) Medullary edema manifested by rapid pulse, respiration, and rising temperature.

Operation is indicated: (1) Depressed fractures. (2) Any case of gradual increasing cerebral compression, regardless of whether it is due to extradural hemorrhage, intradural hemorrhage, or parenchymatous edema. (3) Any case showing definite irritative or paretic signs.

Postepileptic coma, often because of the presence of recent scalp injury, is at times mistaken for fracture, with brain injuries. Cerebral apoplexy in cases that have had recent scalp injuries, and comas, uremic, diabetic, or narcotic poisonings, are likewise an occasional cause for confusion.

Treatment consists in complete rest in a quiet, dark room, head and shoulders elevated, ice-cap to head, heat to extremities.

Various Operative Procedures Indicated by Goitre.

BARTLETT *(Journal of the Missouri State Medical Association,* August, 1921) states that four different types of operation may be indicated. These are selected according to the severity of the case, and may be studied under three separate headings, which he indicates as (*a*) the form of operation, (*b*) where performed, (*c*) the anesthesia used.

1. Hot-water injections or peripheral ligations are reserved for the sickest patients, who are always rested in bed for a considerable time before doing anything of an operative character. Such operations are invariably done in the patient's room in order to minimize the risk of moving, and the psychic shock incident to the operating-room surroundings. Local anesthesia is always used. The tissues are infiltrated with one-per-cent novocaine solution, in which of course no adrenalin is employed on account of its well-known property of stimulating thyroid secretions.

2. One lateral lobe is removed in patients who are considered well enough to stand a very few minutes of radical surgery, but

this is done in clinic through a lateral incision, along the anterior border of the sternomastoid. The wound is left wide open, and in many instances clamps are left in place in order to save the time ordinarily spent in making ligations. This operation is invariably done in the patient's bed, for the reasons previously given. Local anesthesia is always employed since it is adequate for all purposes and distinctly safer than general.

3. Both lateral lobes and the isthmus are in great part removed through the collar incision, which gives the ideal cosmetic result, but the wound is left wide open, to be closed a day or two later in any one of the many ways which are adequate. This third class embraces patients who are hardly well enough to be considered normal risks, and in whom unfortunate surprises might follow any damming up of the wound secretions, hence the open neck. Such patients are always taken to the operating-room, since they are not particularly sensitive to psychic stimuli. Local anesthesia is always used for the reasons given in the other instance.

4. In this group lie all the simple goitre patients who have no systemic goitre symptoms. An almost complete removal of both lobes and isthmus is made through the collar incision, which is entirely closed without drainage, since they are not sensitive in any way nor exposed to the danger of postoperative hyperthyroidism, even if the cavity from which the goitre is removed be not completely dry. Such patients are always treated in the operating-room, since there is no reason for our not availing ourselves of its conveniences. Either local or general anesthesia may be used according to the individual operator's preference.

One who studies the metabolic rate, makes the Goetsch adrenalin test, does repeated blood-pressure and leucocyte determination, will in the course of time build up an instinct for classifying these patients more or less correctly.

As to the unilateral procedure in order to get a tumor by the shortest possible route, an incision is made just behind the anterior portion of the sternomastoid muscle, and parallel to it. This divides skin and platysma, after which the sternomastoid muscle is retracted outward sufficiently to uncover the ribbon muscles, which are split longitudinally, without any cross-division of their fibers. One is astonished at this point to learn how nearly retraction can be dispensed with in displaying the growths, the patient being thus saved much of the discomfort which makes for shock and postoperative symptoms. The lobe is well isolated and the entire defect flooded with alcohol, which seals up the lymphatic spaces and thus does much to prevent the absorption of toxic thyroid juices. The upper pole is divided; the stump is quickly clamped off bite by bite and divided. The clamps may be left in place in order to save the time ordinarily spent in ligating, and the wound held wide open by them, thus conserving the time which would otherwise be spent in closure, at the same time guaranteeing uninterrupted drainage with almost certain prevention of postoperative thyrotoxicosis.

The employment of this simple procedure guarantees one against the imputation of endangering the patient's life by doing too much, and reduces the gravity of a thyroidectomy to little more than that of ligation, in the doubtful class of cases in which it is so difficult to predict the outcome of an operation.

A neck which has been left wide open after a thyroidectomy is more comfortable than one which has been sewn up, although this will perhaps not impress the surgeon who has not employed both methods.

A postoperative therapeutic measure which is of the greatest value in quieting a patient, and bringing down the temperature, is the ice pack, which Crile proposed about one year ago.

The clamps are not touched as long as there is any evidence of postoperative storm. One is astonished upon removing the clamps to see the slit in the ribbon muscles close spontaneously when their function is assert-

ed, to see the sternomastoid muscle slip back into place over the defect just mentioned, and to find that one may draw the skin almost together with adhesive straps, although there is a tendency for the lips of the last-named structure to curl inward.

The removal of the second side through an incision which is the counterpart of that on the first side can be made within a few days, but has also been postponed until the patient has made the gain in health which is characteristic of destruction of half a thyroid gland. The secondary operation, if at a remote date, can of course be performed with every refinement of detail, since it will have no emergency aspect, and after it is completed the skin wound on the first side can be excised and a secondary suture made.

The Thyroid.

CHARLES MAYO *(Medical Record,* July 30, 1921) observes that Kendall in his work used three and one-half tons of the thyroid gland of pigs and is finally able to express in chemical terms the secretion of the thyroid. The clinical work of Plummer and the metabolic work of Boothby, based on Kendall's studies, made it possible to determine the amount of thyroid secretion in an average gland and in an average body, and the length of time that the amount in the body would functionate after the removal of the gland.

Mayo states that at Rochester 25,000 thyroids have been operated upon or treated medicinally when operation seemed inadvisable. He notes that there were about three cases of goitre to each 1000 draft recruits in the district of New York, seven cases to 1000 in the Great Lakes region, eight or nine cases to 1000 in Montana and Idaho. The incidence of exophthalmic goitre, three to 1000, as noted by some western draft boards of the army, is too high for men in the third decade, since most exophthalmic goitres occur in women.

The soft goitres of adolescence respond to treatment with sodium iodide and thyroid extract, although the treatment required may sometimes be prolonged. In this relation the experimental work of Marine may be mentioned. In Akron, Ohio, Marine administered small doses of sodium iodide to three thousand school-girls in a certain area. He found that fewer among this group developed changes in the thyroid than among a similar group to whom no treatment was given. Simple goitres are not uncommon in young persons. Later in life nodular encapsulated adenoma may develop on fetal tissue with colloid, or there may be various degrees of calcareous and fibroid changes; a cystic degeneration is rarely toxic.

The epinephrin test may produce dangerous reactions, and a large percentage of cases might lead to wrong conclusions. Many psychoneurotic patients would be placed with the group of patients having exophthalmic goitre on the basis of the epinephrin test. On the other hand, a failure in diagnosis is almost impossible if the basal metabolic rate is taken into consideration wth other general smptoms. Patients with simple goitres occasionally have slightly low metabolic rates of —8 to —10, but as a rule the basal metabolic rate must be lower before definite symptoms of hypothyroidism are manifest, as in nyxedema. The edema of myxedema in primary hypothyroidism appears quite definitely as soon as the basal metabolic rate falls below —16 or —17. In the treatment of myxedema by thyroxin the appearance and disappearance of the edema can be noted from variations of three points in the basal metabolic rate around —17, and in a period as short as three days. The statement that the removal of thyroid tissue may be extensive and complete without producing myxedema and symptoms of thyroid insufficiency is not supported by the metabolic rate tests on patients after radical or nearly complete removal of the gland.

Substernal goitre is more common than was supposed. Sometimes its presence is indicated by the veins on the neck extending down over the chest, showing the obstruction to the venous flow. This type of goitre

is frequently well encapsulated and can be easily enucleated, especially if the patient coöperates by a little cough. In order to have the advantage of the coöperation of the patient, operations on goitres of this type should be performed under local anesthesia.

Syphilitic goitre is not very common, and sarcoma is rarer than carcinoma. A group of over 200 patients with malignant tumors of the thyroid has been operated on at the Mayo clinic, and in addition the condition of nearly a hundred patients examined was found to be hopeless and operation was not advised.

Treatment with the *x*-ray and radium has been used in the Mayo clinic to some extent. The *x*-ray produces so much connective tissue that the gland will require knife section if operation becomes necessary. The *x*-ray probably has a beneficial effect on the thyroid and might give relief for a period of time; however, a certain number recover, anyway, without treatment. Such severe scarring has followed *x*-ray treatment in a number of cases that the patients were willing to submit to a skin-grafting or any other procedure that promised to remove the scar. The *x*-ray is also dangerous in that it might produce a complete destruction of the gland. One patient came to the clinic with cancer of the skin over the gland caused by long *x*-ray treatment.

Patients with exophthalmic goitre pass through exacerbations of symptoms which are largely influenced by psychic stimuli, and they are easily exhausted. At this period the patients should be treated medically, not surgically. If necessary, ligation, *x*-ray treatment, and hot-water injections may be given in conjunction with absolute rest. Rarely the hot water, not hot enough, probably, made the condition worse by diluting the secretion; the water should be boiling. The injection of quinine urea has not proved of sufficient benefit to be worth while. A basal metabolic rate of plus 85 or plus 100 may fall to plus 35 or plus 40 if the patient is placed under rest and treatment; this may, however, be but a fictitious improvement. A patient with a metabolic rate of plus 56, who has survived a recent exacerbation and is improving, is a safer risk than a patient with a rate of plus 46 who is on the rising wave of exacerbation. Ligation should be performed under local or nitrous oxide anesthesia. Most patients can be operated on under local anesthesia.

With modern technique and methods the mortality in exophthalmic goitre has greatly decreased, probably due more to early operation than to the advances in surgery.

In operating on a patient with a large goitre a transverse incision should be made through the skin and platysma and in the line of the folds in the skin of the neck. The trachea is then exposed, but should not be dissected too freely or congestion and temporary loss of voice or hoarseness will follow on the second day, with recovery later. A primary division of the isthmus should be made with a turning out of the lobes from the trachea in large goitres, as recommended by Balfour. In exophthalmic goitre double resection largely avoids repeated operation; otherwise a small percentage of cases might require a second operation, perhaps at the end of two years, and some might require a third operation.

Twenty-one Years' Experience with Cæsarian Section.

WILLIAMS *(American Journal of Surgery,* August, 1921; quoted from *Bulletin of the Johns Hopkins Hospital,* June, 1921) based his analysis upon 183 Cæsarian sections performed up to December 31, 1920.

The operations were done in a series of approximately 20,000 deliveries, and comprise 104 single and 79 repeated sections. The latter were done upon 41 women, 34 of whom had two, and seven three sections each.

Although the number of white and black patients in the service was approximately identical, many more Cæsarian sections were done upon the latter—114 to 69, while 30 to 11 required repeated sections.

The following types of operation were done: 121 typical conservative sections; 4 extraperitoneal sections; 1 post-mortem section; 57 Porro sections.

The gross mortality was 5.46 per cent, but, upon deducting cases in which death was not attributable to the operation, the net mortality was 3.45 per cent; or 4.07 per cent in the conservative and 1.82 per cent in the Porro sections. All deaths, except one from hemorrhage, were due to infection.

The mortality was thirteen times greater in the first 50 than in the last 133 cases—10 to 0.77 per cent. This remarkable diminution was not due to changes in operative technique, but to the avoidance of ascending infection by operating before the onset or during first hours of labor.

The conservative section late in labor is always dangerous, even if vaginal examinations have not been made; while the Porro section is relatively safe. The most important means of lowering the mortality of conservative Cæsarian section due to disproportion is by learning to determine before the onset of labor whether the operation will be required or not.

The Porro operation is relatively safe even in infected or exhausted patients, as the absence of the involuting uterus hinders the spread of infection. Disproportion due to contracted pelvis was the indication for interference in nine-tenths of the black and in six-tenths of the white patients.

The several varieties of rachitic pelvis afforded the predominant indication in the blacks, as compared with the simple flat pelvis in the whites.

The most frequent non-pelvic indications were eclampsia and serious cardiac decompensation.

Cæsarian section is not the ideal treatment for eclampsia, and is indicated only in the rare instances in which the cervix is rigid and undilated and venesection has not led to improvement.

It is likewise only rarely indicated in placenta previa. But one section was done in 66 cases, and insertion of the rubber balloon is regarded as the best treatment.

Generally speaking, the patient should be sterilized at the third section, either by amputating the uterus or by an operation upon the tubes.

Abdominal incisions are made below the umbilicus, as this permits amputation of the uterus or operations upon the appendages, when necessary, without extending the incision.

The uterus should be incised *in situ*, and eviscerated before incision only in the presence of infection. Experience indicates that in normal cases the latter procedure increases the incidence of infection.

The uterine incision should be sutured in layers, and the greatest care taken to insure the closest approximation of the peritoneal margins.

The uterine cicatrix ruptured once in 48 women with repeated sections, as well as in 12 deliveries through the natural passages subsequent to section. The frequency of its occurrence is probably exaggerated, so that the dictum "once a Cæsarian always a Cæsarian" is not necessarily correct. On the other hand, the possibility of rupture must always be faced, and it constitutes the strongest argument against the unnecessary employment of Cæsarian section for non-pelvic indications.

The placenta was inserted upon the anterior wall of the uterus in two out of every five cases. Consequently it is frequently involved in the uterine incision. This has no other significance than a momentary gush of blood.

The delivery of an asphyxiated child occurs less frequently than is generally believed. Somewhat over one-half of the children cried immediately after delivery, and only 7 per cent were deeply asphyxiated.

Notwithstanding the extraordinary value of pituitary extract in stimulating uterine contraction, pronounced atony with danger of death from hemorrhage is still to be reckoned with, and necessitated amputation of the uterus in two of the patients.

Uterine adhesions were absent in one-quarter of the repeated sections, and were extensive in one-third of them. They are

not necessarily the result of infection, as the puerperium was normal in 36 per cent of the cases in which they developed. In many instances they appear to be associated with imperfect approximation of the uterine wound or with other traumatic factors.

The old superstition that boys originate from the right and girls from the left ovary can be definitely discarded. In two-thirds of the patients the corpus luteum persisted until the end of pregnancy, and its location bore no relation to the sex of the child.

Finally, it should be remembered that Cæsarian section is not devoid of danger, and is relatively safe only when done under appropriate conditions before the onset or during the first hours of labor.

As the uterine cicatrix constitutes a *locus minoris resistentiæ* in subsequent pregnancies, Cæsarian section for other than pelvic indications should be performed only when absolutely necessary. It is the writer's conviction that the operation is being abused throughout the country, and if accurate statistics as to its results were available it would be found to be accountable for many unnecessary maternal deaths. It should be recognized that although it is frequently the easiest manner of delivering the patient in the presence of abnormalities, it is not always the safest, and that ideal results are obtained in only a few clinics.

The Radiation Treatment of Hypertrophied Tonsils.

Osgood *(Boston Medical and Surgical Journal,* July 28, 1921) bases his observations on a series of cases treated both in clinic and in private practice, not selected and with no regard to the type of tonsillar disease.

Filtered radiation in suberythema dose was used. The areas treated should include the skin immediately over the tonsils, and adenoid area if desired. All other parts are protected by lead-foil in such a way that any radiation which could reach them would be negligible. It was found that a series of three or four such treatments, given at an interval of two or three weeks, was sufficient, in the average case, to produce a definite atrophy of the hypertrophied tonsil in a period varying from six to nine weeks after the administration of the last treatment. The raggedness disappeared, and the surface became smooth and shiny, in practically all the cases. Many of them show a definite clinical improvement after the second treatment. The tonsil itself is not actually removed, but decreases to about one-fourth its original size.

Many cases of tonsillectomy, where the tonsil tissue was entirely removed at an early age, have later resulted in a compensatory hypertrophy of the neighboring lymphoid tissue of the oral ring, resulting in a so-called recurrence, or in a granular throat.

Conservative *x*-ray treatment may eliminate this undesirable feature. It should be borne in mind, however, that the action of the *x*-ray on the tonsils is purely on the lymphoid tissue. There is no sterilization of the bacteria or direct action on the material in the crypts. The result obtained is a mechanical one, in that with the shrinkage of the lymphoid tissue the crypts open, and the surfaces become smooth, thereby evacuating the caseated material and mechanically eliminating the bacterial infection. It is possible by this method of treatment to avoid hemorrhage, the discomfort and loss of time of operation, and the pulmonary sequelæ which frequently occur after tonsillectomy in the adult.

With the dose and method used it is safe and reasonably sure in cases of hypertrophied or chronically infected tonsils with hypertrophy, where the infection is due to bacterial lodgments in crypts formed by overgrowth of lymphoid tissue. It is especially indicated in those cases in which operation is deemed inadvisable or must be delayed because of cardiac or pulmonary complications. The disadvantages are chiefly the time required to obtain final results and the necessity for the selection of suitable cases. It should be understood, however, that radiation treatment in its present stage is by no means a replacement of sur-

gery. There are many types of cases, as, for example, the atrophied, chronically infected tonsils, the abscessed tonsils, etc., which are obviously unsuited for *x*-ray therapy.

Much has been said about the *x*-ray dangers over the neck. These dangers are (1) the possibility of *x*-ray dermatitis; (2) the possibility of other than lymphoid tissue being affected by the ray; (3) the possibility of late degenerative changes in the skin.

In answer to the first objection, it should be recalled that the dose given in the average case is much less than that required to produce an erythema of the skin. The risk in the hands of the expert radiologist is no greater than that which the patient undergoes at the hands of the expert laryngologist.

It is true that the sensitiveness of the skin to *x*-ray varies with the age, younger children being more susceptible than adults, but this is taken into consideration in estimating the dose to be administered. The dose is measured in physical factors, which may vary for different types of *x*-ray machines. It is obvious, therefore, that the operator should have sufficient experience with his machine to judge its limitations, and the variations in the factors used to calculate the erythema dose. If the treatment of tonsils by *x*-ray is left in the hands of a trained radiologist accustomed to the use of his equipment, the possibility of dangers from *x*-ray burn is remote.

Degenerative changes in the skin occurring several years after treatment, in case of prolonged radiation, have been observed in thyroid patients even where no record of a definite erythema had been noted at any time. In the treatment of tonsils, however, the dose is much smaller than that which was found to be safe over the neck. The fewer number of treatments with the smaller doses required are well within the limit of safety even for very young children. It is further possible, by subdividing the dose into a large number of applications, to reduce still further the possibility of skin atrophy, or telangiectatic changes.

Sacrococcygeal Dermoids.

STALEY (*Minnesota Medicine,* Volume IV, No. 7, 1921) comments on the rarity of these tumors, and observes that they often give no trouble at all till communication is established between the cyst and the skin. Thereupon irritating discharge continues until the affected area is excised. Cysts in this location have been mistaken for other conditions, among which are the various infections of the bones, including tuberculosis and pyogenic infection. The external opening of the fistula may be close to the sphincter ani, and in that one respect resemble the sinus of perirectal abscess.

In addition to the simple dermoids there are several more complex tumors occurring in this region which are the result of misplaced fetal remnants. The literature concerning those anterior to the sacrum has been well reviewed by Law and by Lund. Those posterior to the sacrum are classified by Ewing as simple dermoids, complex dermoids, teratoid tumors, teratomas, and fetal implantations.

The largest specimen removed was the size of a hen's egg, the smallest the size of a marble. The tissue was hard, grayish-white in appearance, and of approximately the consistency of cartilage. The masses were not encapsulated, the indurated tissue merging with the surrounding soft parts.

The condition is seen most frequently in young adults and in otherwise healthy individuals. In the nineteen cases collected by Mallory the average age was twenty-one years.

The fistulous opening when single is usually in the midline. It may be below the tip of the coccyx and close to the external sphincter. When found in that location the fistula may easily be mistaken for the sinus resulting from perirectal inflammation. The openings may be multiple, one above the other, or the tracts may extend outward from the midline under the subcutaneous tissue of the back or buttocks. Of the above mentioned cases collected by Mallory, 4 of the 19 had two or more fistulæ.

In some cases there may be a large area of inflammatory tissue with many sinuses, and closely resembling tuberculosis of the sacrum. It may not be possible to determine the character of lesions in such cases before operation, when normal serum is found to underlie the mass of inflammatory tissue.

When one considers the pathology of the condition, which is that of a tube lined by epithelium extending from the surface of the skin into a mass of chronic inflammatory tissue, it is evident that anything in the way of treatment except complete excision will not be effective. After passing a probe into the fistula it should be dissected out down to its termination. Then by means of the finger-tip the indurated areas are identified and completely excised. The wounds in the four cases above reported were partially closed with silkworm-gut sutures; a drain was inserted between the sutures.

Control of Chronic Pain.

DYAS *(Surgery, Gynecology and Obstetrics,* August, 1921) observes that current medical journals are full of accounts of operations designed to restore the lagging functions of youth and are read with avidity by both the medical profession and the laity. Possibly the reaction from the destructive processes of war has stimulated an effort upon the part of the writers to conserve life to the uttermost and to make procreation, even by the senile and by the abnormal, the great aim of the investigator.

While these attempts to stretch the span of life beyond the allotted three score years and ten and to restore the waning power of the sexual glands are worthy of admiration, there are some problems of a nature so practical and so pressing that there is some excuse for directing our energies away from the more alluring search for the fountain of youth. Among these is the urgent need of a method for the accurate and scientific control of chronic pain, especially that due to recurrent inoperable malignancy. The intractable pain of tic-douloureux stimulated attempts to give relief to the sufferers by a method less hazardous than the surgical removal of the Gasserian ganglion, which had an operative mortality of 50 per cent in the hands of the most experienced operators. To this end avulsion of the ends of the branches of the trifacial nerve, as far as possible beyond their foramina of exit, was practiced with temporary relief. This plan was succeeded by the injection of the nerve trunks by 2-per-cent osmic acid. Relief was obtained by this plan for varying periods, but it had the disadvantage of being extremely irritating to the surrounding tissues and frequently caused necrosis when the injection was not accurately made into the nerve sheath.

Injections of alcohol of varying strength have proved satisfactory in a large number of cases of facial neuralgia and have produced analgesia for a period of six to eighteen months. Thus the efforts to short-circuit the painful area in facial neuralgia constitute the first accurate, scientific, and safe method of combating chronic pain.

It seemed possible, therefore, to render other areas analgesic in which the paths of pain conduction were accessible to the injecting needle. If it is possible to perform almost any type of operation under local anesthesia, why should it not be just as feasible to render any given field painless for a greater length of time?

While the material at hand did not give an opportunity to test out a great many areas, the results achieved in the cases treated at least justify a more extended application of the principle, *i. e.,* local anesthesia for the relief of chronic pain.

As the experimental and clinical data have not been sufficient to render an exhaustive report, this paper is presented rather as a preliminary study than as a complete work. The possibilities of mastering pain in hopeless conditions of malignancy was the incentive under which this work was undertaken. Every surgeon has seen cases of malignancy in which apparently none of the older methods gave relief. The woman with recurrent carcinoma of the breast, rocking constantly to

and fro with the pain, is not an uncommon patient in any large hospital. The dread picture is familiar to us all, and yet so far no work has been undertaken for its relief. Many persons have no fear of death, yet who does not dread pain?

In many situations chronic pain may be controlled by interrupting the paths of pain conduction by the methods in vogue in local anesthesia. The scientific accurate control of the pain will do much to rob the course of hopeless malignancy of its horrors. The mental anguish may remain, but the somatic suffering in most cases can be spared to the patient. The relief of constant pain revives the drooping spirits of the sufferer and enables him to put on weight and to gain in strength. The time-honored but inefficient attempts to produce an euthanasia by the administration of ever-increasing doses of opium or other narcotics must give place to a procedure which is efficient and which preserves the individual as himself to the end.

The short-circuiting of the painful area is accomplished by nerve-blocking in the form of neurectomy or of intraneural injection. In relatively small superficial malignant lesions the same end may be accomplished by the healing of the ulcer by radium. This is especially true of lesions about the orifices of the body. Nerve-block relieves the pain during the period of healing.

The agents used for intramural injection are numerous, and it is probable that no single drug is suitable to all cases. Chronic pain due to some condition other than malignancy is perhaps best treated by salt solution, novocaine, apothesine, or quinine and urea, because these produce but temporary loss of pain conduction. In painful states due to malignancy in which loss of motor function is of little moment, alcohol injections of the nerves or neurectomy is indicated. In cases of recurrent mammary carcinoma with great swelling and edema of the upper extremity, the patient usually has to carry the involved arm almost as a foreign body. Pain and swelling are so great that movement is practically impossible. Under such circumstances permanent block of the brachial plexus is indicated either by alcohol injection or by nerve resection. Nerve-block of the posterior sensory spinal nerve roots or intercostal nerves is frequently necessary as an adjunct to brachial plexus block because of metastasis into the tissues of the chest.

In thorax operations injection of intercostal nerves is done at the lateral margin of the erector spinæ muscles near the angle of the ribs rather than close to the spinal column. On account of the many injections necessary when all the intercostal nerves are blocked, it is better to mark out the points of attack first, and these are later connected by a line of infiltration reaching from the first to the twelfth rib. The patient is in a sitting position with the spine flexed and the shoulder on the affected side carried forward. The nerve-block is now done by introducing the hollow needle just inside the infiltrated area about on a level with the spinous process of the first dorsal vertebra. The point is carried downward until the resistance caused by its contact with the first rib is felt. The under border of the rib is now sought, and as soon as the point meets no more bony resistance the needle is forced in for the distance of one-half centimeter further and 5 cubic centimeters of solution injected. The same procedure is carried out in the second rib, and so on until the desired area has been blocked off. After fifteen minutes there is analgesia of the ribs, muscles, and pleura from the point of injection posteriorly as far forward as the sternum.

Kuhlenkamp's method of blocking the brachial plexus for the relief of acute and chronic pain in the upper extremity is as follows: The first rib is palpated just above the point where it passes beneath the clavicle. Slightly external to this the pulsation of the subclavian artery may be felt. The hollow needle is introduced just beyond this. If blood appears the needle is carefully withdrawn and introduced more laterally. It is carried downward until the

resistance of the first rib is felt or until the patient feels the referred pain in the arm. The syringe is then attached and 5 to 10 Cc. of one-half-per-cent solution apothesine or novocaine injected. Care should be observed not to use the needle as a lever because of the danger of tearing the subclavian vein. Analgesia appears in about fifteen minutes.

It is not necessary with the use of novocaine or apothesine to inject the nerve sheath, although this is desirable because these agents are diffusible, while with quinine and urea or alcohol it is necessary to inject the nerve sheath. It is therefore recommended that the plexus be exposed by incision under local anesthesia, when permanent analgesia is required for the relief of pain due to malignancy. With the plexus exposed either alcohol injection of the cords or section should be done.

Dupuytren's Contracture of the Fingers.

From a study of the material of the Surgical Hospital of Helsingfors for the years 1888 to 1920 KROGIUS (*Surgery, Gynecology and Obstetrics,* September, 1921) came to conclusions somewhat different from those generally accepted. Among his 22 patients he found the condition beginning in the second decade of life in two, in the third decade in six, in the fifth decade in four, and after the fifth decade in six. Eighteen of the patients were males, and four were females. Three of the latter were young girls, in whom the condition was bilateral.

Krogius has discovered one family in which a man with Dupuytren's contracture had 15 descendants with the same condition. Kajava found flexor brevis muscles of the hand in mammals, a fact which suggested to the author that contraction of the palmar fascia might be due to degenerated remains of anlages of such muscles. According to Kajava, these muscles are present more on the radial side in the lower mammals, but in the higher mammals they are found exclusively in the fifth or the fourth and fifth fingers. Graefenberg found in a human embryo the anlage of such a flexor brevis muscle which later blended with that of the flexor digitorum sublimis.

The palmaris brevis muscle, which is innervated by the ulnar nerve, arises, according to Kajava, from remnants of these flexor brevis muscles of the hand. In histologic specimens of palmar fascia of the new-born Krogius found in the connective tissue islands of striated muscle tissue which evidently change later into connective tissue.

The palmaris brevis is inserted by means of tendon fibers into the skin; similar fibers pass from the palmar fascia to the skin.

Krogius examined 13 specimens of Dupuytren's contraction microscopically. In none of them was there any small-cell infiltration or sign of inflammation. In old cases he noted only connective tissue poor in cells. The latter were arranged like those in the connective-tissue cords of the sternocleidomastoid in wryneck. In recent cases he found tissue rich in cells with large nuclei. In specimens of different ages it can readily be seen how the tissue becomes poorer in cells as it grows older and the connective tissue bands become denser.

Krogius believes that the tissue rich in cells is embryonic, fundamental tissue which normally would have formed muscle or tendon tissue. In his opinion the only cause of Dupuytren's contraction is an embryonic anlage.

In contrast with this study, and by chance supplementary to it, BYFORD *(Medical Record,* Sept. 17, 1921) observes that the treatment is purely surgical. *X*-ray, fibrolysin, ionization, and the iodides have all been tried without result. Dupuytren dissected out the fascia and involved skin, allowing the wound to heal by granulation. Adams was an exponent of subcutaneous division of the bands, followed by splinting, for a long period of time. Aseptic surgery has caused this method to be abandoned, and the open operation with dissection of the palmar fascia from the skin and from

the underlying structures is generally performed. This is usually followed by splints, constantly in application for one month, intermittently for another month, and at night for from six to eight months.

Hutchinson in his Hunterian address in 1917 offered a somewhat more complicated but better treatment. He believes that the long-continued splinting results in frequent stiff joints and recurrence of the contraction. He makes a palmar incision and dissects out the fascia. If the case is recent, no further surgical procedure is necessary, and the fingers after a few days, a week at the most, are moved passively and soon actively. Except during the first few days, no splints are used.

In operating on these hands the surgeon must be sure that the contraction is stationary. That long splinting would cause a stiffness of the joints is not improbable, but that it would cause a recurrence of the contraction does not seem reasonable. To insure against a second hypertrophy and contraction of the fascia, a thorough examination should be made and all sources of infection removed. A careful measurement of the contraction compared with a second measurement six months later will indicate whether or not the condition has become stationary. If it has been stationary for six months after the removal of all infected tissues, the probability of a second contraction is small.

In conclusion the author believes that Dupuytren's contraction is frequently associated with and closely allied to rheumatism.

It is probably due to bacterial action at some point other than the palmar fascia.

The most common site of this infection is in the teeth.

All foci of infection should be removed to prevent progression of the contraction.

A period of six months should elapse between the removal of these foci and the treatment of the contraction itself.

Reviews

PROGRESSIVE MEDICINE. A Quarterly Digest of Advances, Discoveries and Improvements in the Medical and Surgical Sciences. Edited by H. A. Hare, M.D., LL.D., assisted by L. F. Appleman, M.D. Volume III, September, 1921. Lea & Febiger, Philadelphia, 1921.

The present issue of Progressive Medicine, which should have appeared in September, has been delayed owing to a printers' strike. It contains, as have the September issues in previous years, articles covering the literature on Obstetrics during the past twelve months by Edward P. Davis, Professor of Obstetrics in the Jefferson Medical College; an article on Diseases of the Thorax and its Viscera, including the Heart, Lungs, and Blood Vessels, by O. H. Perry Pepper, Assistant Professor of Medicine in the University of Pennsylvania; a third on Dermatology and Syphilis, by Jay F. Schamberg, Professor of Dermatology and Syphilology in the Post-Graduate School of the University of Pennsylvania; and one upon Diseases of the Nervous System, by William G. Spiller, Professor of Neurology in the same institution.

The reputation of all of these contributors is a sufficient guarantee of the adequacy with which they have summarized the various departments under their care.

THE SPLEEN AND SOME OF ITS DISEASES. By Sir Berkeley Moynihan. W. B. Saunders Company, Philadelphia, 1921. Price $5.

This volume, printed in large type with ample spacing, contains 129 pages and 13 full-page diagrams. It represents the Brad-

shaw Lecture before the Royal College of Surgeons of England for 1920, and provides in concrete form a large amount of valuable information, some of it based upon the author's own experience, with copious quotations from others who have studied diseases of the spleen both from the medical and surgical aspect. By means of the full-page diagrams to which we have referred, the author attempts to reveal to the eye almost at a single glance the chief lesions which occur in the different organs in association with splenic abnormalities.

Naturally the information that is contained in the book leans strongly to the surgical aspect of the subject debated. So skilful a surgeon as Sir Berkeley is prone to speak too enthusiastically in regard to surgical measures for the relief of grave conditions which are often fatal, but we think that we are correct in the statement that in the present volume, while fully recognizing what surgery can do, he does not hesitate to point out that under numerous conditions surgical interference is contraindicated. The book is one which should be in the hands of every physician and surgeon who is interested in diseases of the organs closely associated with the blood-making and blood-breaking organs of the body.

A Text-book of Surgical Anatomy. By William Francis Campbell, M.D., F.A.C.S. Third edition, revised. W. B. Saunders Company, Philadelphia, 1921. Price $6.

This very handsome volume, printed upon heavy paper and illustrated by no less than 325 original illustrations, is a book which we feel confident will be welcomed in its third edition even more enthusiastically than when the first and second editions appeared. The book is remarkable in the clearness of its statements and for the excellence of its pictures, which are so skilfully drawn that they really present to the eye of the reader the pathological conditions which exist or the anatomical facts with which it is essential that the surgeon and physician shall be familiar. In some instances the picture is that of a normal human body, or part of a body, except at the point which is under discussion where the muscles, nerves, bones and lymphatics or joints are exposed to give the physician a clear conception of what he will find after his dissection is made. Interesting illustrations of the thoracic and abdominal contents not only from before backward but from backward forward are also included.

There are not many books written by a sugeon that appeal not only to his colleagues in his particular line of work, but to medical men as well. This is a book which fits the needs of both types of practitioners even though the physician may not practice surgery.

Although the physician may be too busy to read the text through and through, the illustrations which appear on almost every page will, at a glance, refresh his memory as to anatomic relations and positions in a most efficient manner. We have rarely seen a book in which the illustrations seem to us so adequate, so complete, and so clear, even as to minute detail, and yet at the same time not diagrammatic but truly representative of natural conditions.

A Treatise on Diseases of the Skin for Advanced Students and Practitioners. By Henry W. Stelwagon, M.D., Ph.D. Ninth edition, with the assistance of Henry Kennedy Gaskill, M.D. W. B. Saunders Company, Philadelphia, 1921. Price $10.

When it is recalled that it is just twenty years since the first edition of Dr. Stelwagon's book appeared, and, in addition, that since that time it has been frequently revised and reprinted, it is evident that notwithstanding its exhaustive character it must have been appreciated by a very large number of physicians in general practice as well as by that comparatively limited number of men who are known as dermatologists. The sudden death of Dr. Stelwagon a few years ago necessitated the addition of Dr. Gaskill to the authorship in order that this ninth edition might be brought up to date, and he has succeeded admirably in carrying out the ideas of his friend and former teacher.

It will be recalled that the book has always been characterized by profuse illustrations. The present edition contains 401 illustrations in the text and half-tone plates. Many books which have appeared upon diseases of the skin have been good as to their text, but poor as to their illustrations, particularly when an attempt was made to use colors. In this book the clearness of the illustrations is remarkable in their resemblance to life. Doubtless this fact has been influential in making the book popular in previous editions, because by a glance with the eye as much can be obtained for diagnosis as by reading pages of text.

Originally written by a master of his subject, the book is well worthy in the future of the support which it has received in the past, the more so as the complete bibliography which appears from page to page has been kept up to date. The exhaustive character of the work may be imagined when we state that, with the index, it contains no less than 1313 pages.

HISTORY OF MEDICINE. With Medical Chronology and Suggestions for Study and Bibliographical Data. By Fielding H. Garrison, M.D. Third edition, revised and enlarged. W. B. Saunders Company, Philadelphia, 1921. Price $9.

Many years ago we heard the late Professor Alfred Stillé assert that one of the causes for slow advancement in medicine was the fact that its votaries were wofully ignorant of the history of medicine and expended their energies along lines which had at least been partly covered by their predecessors.

That a book devoted to medical history should have reached a third edition in nine years is, we think, a remarkable manifestation of the fact that Stillé's criticism is to some extent at least no longer true, for while this book does not deal especially with the thorough researches which were made by our forefathers and is devoted very largely to a consideration of individuals who, from time to time, have made their mark in various countries, nevertheless in his description of the work that they did, rather than of the men themselves, he points out the trend of scientific investigation and so prevents the reader from thinking when making a research that he is the wonderful pioneer that his work leads him to believe.

The book, in this new edition, is furnished with an exceedingly copious index and covers nearly 950 pages. It may well be considered a notable tribute on the part of a studious medical man to the literature of our profession.

THE MEDICAL RECORD VISITING LIST AND PHYSICIAN'S DIARY FOR 1922. William Wood & Company, New York, 1921.

This excellent Visiting List is readily put in the coat pocket of the physician. By means of it he can record the visits paid to or by his patients, with records of charges and payments made, obstetrical engagements, general memoranda, etc. The first few pages of the list contain a dose list, approximate equivalents, a calendar for 1922 and for the first six months of 1923, a diagram whereby the duration of pregnancy may be calculated, and other facts to which the physician may turn hurriedly when face to face with an emergency or need of immediate information.

THE PHYSICIAN'S PERFECT CALL LIST AND RECORD, 1922. Thirty-sixth edition. E. G. Swift, Publisher, Detroit, 1921.

This book provides the physician with a simple, practical method of keeping accounts with his patients. As the publisher says, it saves time, simplifies bookkeeping, and prevents losses. The forms for keeping a record of calls have been improved to the point of perfection. A place is provided for an obstetrical record, a record of deaths, a vaccination record, and a record of bills and accounts, together with bl nks for various memoranda, monthly summary, etc. There are complete dose tables, an obstetrical table, a table on differential diagnosis of eruptive fevers, and many others, all conveniently arranged and indexed. Handy coat pocket size, with the physician's name embossed in gold.

THE PRACTICE OF UROLOGY. By Charles H. Chetwood, M.D., LL.D., F.A.C.S. Illustrated. Third Edition. William Wood & Company, New York, 1921. Price $8.

The call for a third edition of Chetwood's book sufficiently attests the favor with which his sound teaching has been received by the profession, nor do we find any changes other than those indicated by newer methods which have stood the test of application in the hands of the expert.

The author has the gift of proportion in that his text is not encumbered either by unnecessary words or details. It is a clear, logical and sequential description of lesions, symptoms, and treatment. There is a brief but excellent chapter upon Embryology, followed by others on Diagnosis. Thereafter the various abnormalities and infections are taken up in systematic order. There is a final brief section on Syphilis.

A book to be warmly commended to the general practitioner, who would have a means of ready reference in cases lying within the domain of urology that may present themselves for treatment.

INFECTIONS OF THE HAND. By Allen B. Kanavel, M.D. Fourth Edition, thoroughly revised. Illustrated. Lea & Febiger, Philadelphia and New York, 1921. Price $5.50, cloth.

There are few surgical monographs which have had a wider reaching and beneficent effect upon both surgeons and patients than Kanavel's first edition of Infections of the Hand. This common and inadequately treated, crippling accident is set forth as to etiology and progress, prevention and treatment in such wise that his pronouncements have been regarded as authoritative and have been followed by all intelligent surgeons. The call for a fourth edition attests to this fact, and is welcomed by the profession in that it incorporates the knowledge gained during the war bearing upon gas bacillus, the streptococcus infections, and enables the author to add a chapter upon restoration of function in infected hands.

The arrangement of the book is as before —indeed, it could not be improved upon. It sets forth facts needful to a clear understanding upon which must be based proper surgical procedure. The author in his preface gives warning as to care in the diagnosis and treatment of tenosynovitis, and states that an increasing experience has demonstrated that with careful and intelligently directed treatment, hands suffering even from this dreaded complication may be restored to complete function.

By the house surgeon, general practitioners, industrial surgeons, and indeed by all who practice the healing art, the facts set forth by Kanavel should be known and applied.

Notes and Queries

An Error in the Dose of Arsphenamine.

Our attention has been called to the fact that in the November number of the THERAPEUTIC GAZETTE (p. 818), in a synopsis of Dr. Guy's paper on "A Valuable Method of Treatment in Selected Cases of Syphilis," the dose of arsphenamine is given as 5 grams, when, of course, 0.5 gram is meant. The correct dose is given in the context, however. The error arose through the original article making the same mistake.

Freight Rates and the Farmers.

Deere & Co., of Moline, Illinois, one of the oldest and most reputable concerns manufacturing agricultural implements, have copies of a letter received by them from a farmer living in the neighborhood of Culbertson, Nebraska, and of their reply thereto, which set out graphically present relations between the prices of farm products, prices of manufactured goods and transportation charges, and the effect of these abnormal relations upon business.

We have not the space to give the letter in full, but the following extract from the farmer's letter gives the gist of it. He says:

I need a wagon and my dealer wants the price of 650 bushels of corn; the same wagon I could buy with 200 bushels of corn before the war. The harness man wants the price of a wagon-load of hides for a No. 1 harness. I simply cannot see my way clear to buy wagon, harness or anything else that I can possibly manage to get along without.

Deere & Company make a lengthy and detailed reply, in which they first tell of the rise in the price of wagon stock in recent years due to the depletion of our forests, a factor of great general interest, but for which no immediate remedy is possible. They then go into the effect of increased freight charges, as follows:

Our present price, F. O. B. Moline, on a farm wagon, is 100 per cent higher than our price of 1914. At this price we are selling this wagon at approximately 20 per cent less than our cost. The cost to you at Culbertson, Nebraska, however, does not bear the same relation to the prewar price, for the reason that in 1914 the freight on a farm wagon from Moline to Culbertson was $1.37 a hundred; the present rate, including the war tax, is $2.32.

A farm wagon weighs 1200 pounds. The difference in freight of 95 cents per hundred makes the transportation on this wagon alone cost $11.40 more than it did before the war. The increased transportation costs upon the materials that go into the wagon are even greater than this amount.

When you come to pay for this wagon through the sale of corn in the Chicago market, you have a still greater disadvantage, due to the fact that corn has declined since 1914. The freight on corn from Culbertson to Chicago in 1914 was 24½ cents a hundred, or approximately 14 cents a bushel; to-day, with the 3-per-cent war tax included, it is 47 cents a hundred, or approximately 26 cents per bushel, so that you pay 12 cents a bushel more to get your corn to Chicago than you did in 1914.

You state that it requires 650 bushels of corn to buy a wagon to-day. At 12 cents a bushel increased freight this means that you are paying the railroads $78.00 more transportation on the corn necessary to buy this wagon, therefore your increased contribution to the railroad company in getting this wagon out there and shipping corn enough to Chicago to pay for it, is $89.40.

You can well see from this that it is absolutely impossible for any of us to get back to a normal basis of prices until the cost of transportation is very materially reduced. You ask us when conditions will change; we tell you, when transportation costs are gotten back upon a reasonable basis. The great difficulty in getting this adjustment now is the expense the railroads are put to for labor; for example, here in this community, while the going rate of labor is 30 cents an hour, at the Rock Island shops 43 cents per hour is being paid for eight hours a day and time-and-a-half for overtime, with the proviso that if more than one hour's overtime is worked, even though it be ten minutes, five hours' additional compensation is charged. Locomotive engineers are getting from $3500 to $5000 a year. A good deal the same condition obtains in our coal mines.

We all must work, through our congressmen and through a united public sentiment, to secure a readjustment of these railroad and mining costs before any of us can hope to resume business in a normal way. As far as we here are concerned, we have already made substantial reductions in our prices and expect to continue to do so in future as reduced costs of production permit. We are continually operating at a very substantial loss. The business world, outside of transportation and mining, has gone as far as it can until it gets relief through these channels.

The character of some of the rules and regulations may be judged by the following extract from a recent speech by Governor Henry Allen of Kansas. He was discussing the "make work" policy so often pursued by the labor unions, and referring to the great increase of employees on the railroads under government management. He said:

Recently I examined the new regulation of crafts in the railway business. One sample is sufficient to show the extraordinary effect that has followed the illogical expansion of the personnel. This typical case relates to the removing of a nozzle tip from the front end of a locomotive. Mechanically it is as simple an operation as the unhitching of a team of mules, yet here is the elaborate provision of the craft's regulation for performing this task.

It is necessary to send for a boiler maker and his helper to open the door of the boiler, because that's a boiler maker's job. Then you must send for a pipe man and his helper to remove the blower pipe, because that is a pipe man's job. Then you must send for a machinist and his helper to remove the nozzle tip, because that is a machinist's job. Thus they have used three master mechanics and three helpers to perform a simple task which in the prewar days was performed by a handy man around the place who was called a helper. Has it brought prosperity to the railroad men? More railroad men are out of employment in the United States to-day than at any other time since the administration of Grover Cleveland. The doctrine of doing as little as you can for as much as you can get has killed the goose that lays the industrial egg.

INDEX TO VOLUME XXXVII, THIRD SERIES

(WHOLE SERIES, VOLUME XLV)

Abdominal contusions, mild..... 602
growths, diagnosis of by the pneumoperitoneal Roentgen-ray method..... 882
infection, the alkali reserve in..... 490
infections, acute—early diagnosis of.... 742
lesions, upper—the significance of shoulder pain in..... 520
operations, local anesthesia for extensive 833
regional anesthesia and splanchnic analgesia for..... 521
pain in children..... 404
tuberculosis in children..... 860
Abduction treatment of fracture of the neck of the femur..... 329
Abnormal feet and their management..... 211
Abortion, the induction of..... 512
the treatment of..... 293
Abortive treatment of gonorrhea..... 525
Absorption from serous cavities..... 129
of local anesthetics through the genitourinary organs 415
Acacia-glucose injection, blood analysis following 210
Accelerating the elimination of carbon monoxide from the blood, a therapy for..... 47
Acetylsalicylic acid locally after tonsillectomy, and in acute pharyngitis..... 840
Acid-base equilibrium in disease from the point of view of blood gases..... 490
Acid intoxication, epidemic..... 344
Acne, the modern treatment of..... 431
Acriflavine in the treatment of gonorrhea in women 42
Actinomycosis of the mammary gland, treatment of 548
Acute infections of the hand and their surgical treatment..... 181
intestinal obstruction 680
mastoiditis, treatment of..... 36
toxemia, the treatment of..... 795
Addison's disease, the use of adrenalin in... 483
Address presenting memorial tablet to Jefferson Medical College, October 7, 1920... 10
Adenoids, removal of in infancy..... 203
Adrenalin, action of on the heart..... 260
and cocaine in the treatment of bronchial asthma 239
and pilocarpine in bronchial asthma.... 512
and the bronchioles..... 39
hypersensitiveness and its relation to hyperthyroidism 650
in Addison's disease, the use of..... 483
in arrested heart action..... 421
injections, cardiovascular response to... 107
in dementia præcox, effect upon the blood pressure of..... 38
in resuscitation 658
from apparent death..... 427
in the treatment of asthma..... 729
of lobar pneumonia 726
of vomiting in pregnancy 649
pituitrin, pilocarpine, and atropine, volume changes of the cerebrospinal fluid after 792
the best remedy for the untoward effects of arsphenamine 701
the use of in bronchial asthma in childhood 52
Adsorbed alkaloids, intestinal extraction of 49
Aims and duties of the student..... 162
Air and food passages, symptomatology and diagnosis of foreign bodies in the..... 750
Alcohol and caffeine, a comparison of..... 83
fatigue, and mental activity..... 271
influence of dilution on the toxicity of.. 192, 272
Alcoholic liquids, the toxicity of..... 210
Alkali reserve in abdominal infection..... 490
Amebic dysentery in Siam..... 492
Amputations, the war leading to better methods for 517
Anal fissures and hemorrhoids, desiccation treatment of 812
Analysis of the end results of treated chronic septic myositis, neuritis, and arthritis.... 261
Anaphylactic shock, simple procedure for avoiding 598
Anderson, William Gilbert: Posture a Cause and a Remedy in Enteroptosis..... 381
Anemia, pernicious, and its treatment..... 879
—a study of..... 279
secondary—the value of iron in..... 783
simple—blood regeneration following... 42
splenic: Banti's disease..... 448
Angina pectoris, section of cervical sympathetic for 893
Anesthesia and its relation to postoperative morbidity 754
and operation, use of carbon dioxide after 510
blood pressure during..... 558
in obstetrics 665
local—present status of the problem of 745
the proper method of inducing..... 265
Anesthetics, general, in endoscopic procedures 234
Angiomata, complications observed in the treatment of with radium..... 146
Ankle-joint injuries and their treatment.... 374
Antepartum hemorrhage, the treatment of.. 206
Anthrax, cutaneous—antianthrax serum..... 363
—treatment of 824
treatment of with normal ox serum..... 354
Antidiuretic effect of pituitrin in diabetes insipidus 664
Antidysenteric serum, the production of.... 102
Antigonococcal serum, the use of..... 488
Antimeningococcic serum, simplified production of..... 340
Antimeningococcus serum, polyvalent—the potency of 340
Antimony in the treatment of filariasis, the uselessness of 112
Antiscorbutic vitamine, deficient—swelling of the pinna an early sign of..... 576
Antitetanic serum, the use of in the British army 671
Antitoxin in the treatment of diphtheria.507, 885
of tetanus 733
treatment of tetanus..... 216
Antityphoid inoculation, symptoms resembling tabes dorsalis arising after..... 188
Anxiety neurosis, the relief of..... 623
Aortic aneurism, wiring and electrolysis for 694
Apical pneumonia, treatment of meningeal phenomena in 540
Appendicitis, acute, and acute appendicular obstruction 368
—indications for the treatment of, from the standpoint of the surgeon..... 153
—the treatment of..... 77
a point or two in regard to..... 249
chronic—operations for 487
the causation of 220
truths and fallacies about..... 229
Appendicostomy and cecostomy for intestinal stasis in epilepsy and neurasthenia..... 59
Appropriate dose of tuberculin..... 341
Arsenical poisoning, a case of delayed..... 510
chronic—scleroderma as a possible manifestation of..... 359
magnesium sulphate in..... 586
preparations, the exhibition and doses of other than in syphilis..... 169
products a cause of ocular accidents.... 121
treatment of syphilis, dermatitis and allied reactions following the..... 792
Arsphenamine and mercury in the treatment of paresis 869
in the treatment of syphilis 583
and neoarsphenamine, bearing of the administration of upon further infection in syphilis 703
some salient facts regarding the toxicity of..... 47
an error in the dose of..... 911
in non-syphilitic persons, reactions following the intravenous administration of 352
in the treatment of syphilis of the nervous system 51, 291
reaction, acute—prevention of by antianaphylaxis and atropine..... 720
serum precipitates and their relation to clinical reactions 591

Arsphenamine, the intensive administration. 134
the oxidation of. 128
treatment of syphilis, complications of the 651
untoward effects of—adrenalin the best remedy for the. 701
Arsphenamines and mercury, histologic changes in organs induced by. 660
in therapeutics, the applications and limitations of 52
Arterial hypertension and benzyl benzoate.. 113
Arteriosclerosis, treatment of. 197
Arthritis, a group study of 300 cases of. 369
chronic—the value of foreign proteins in the treatment of. 701
infective, and allied conditions. 807
non-specific protein therapy in. 477
rôle of the prostate and seminal vesicles in 743
Artificial pneumothorax, important considerations in the administration of. 478
Ascites, due to cirrhosis of liver—saphenoperitoneal anastomosis for. 457
the treatment of by drainage. 248
Aspirin intolerance, a case of. 492
Asthma and the nasal cavities. 417
bronchial—etiology of 150 cases of. 416
in childhood 52
—the treatment of. 685
treatment of 729
of by autogenous streptococcal vaccines 872
Atmospheric conditions and efficiency. 715
Auricular fibrillation and flutter. 717
quinidine sulphate in 855

Bacterial exotoxins, paths of spread of. 60
vaccines—chloretone solution as a vehicle for their administration. 187
Baketel, H. Sheridan: Silver-salvarsan and its Uses 549
Balloons in the treatment of placenta prævia 866
Banti's disease, treatment of. 448
Basal metabolic rate, determination of the and its value in diseases of the thyroid gland 335
metabolism as an index of treatment in diseases of the thyroid. 666
—its application to internal medicine 690
Basis of a scientific therapy. 811
Battey, Robert, M.D.—a diary of. 612
Bearing of the administration of arsphenamine and neoarsphenamine upon further infection in syphilis. 703
Beates, Henry, Jr.: The Use and Proper Dose of Digitaline. 533
Behrend, Moses: Indications for the Treatment of Acute Appendicitis, from the Standpoint of the Surgeon. 153
Belladonna in the treatment of spastic constipation 34
Benzyl alcohol for toothache. 188
benzoate in arterial hytertension. 113
in bronchial asthma in childhood... 52
in circulatory conditions. 17
in pediatric practice. 342
in protozoal dysentery. 282
in seasickness, the use of. 200
esters, the effects of. 704
Bicarbonate of soda in the treatment of sprue 586
of sodium in the treatment of diabetic acidosis 728
Bile salts in infantile marasmus. 514
Biliary tract, medical drainage of the. 430
Bismuth mixtures, injection of into the lung 816
Blackwater fever, a study of. 491
Bladder cancer, treatment of. 65
Blair, Thos. S.: The Ebb and Flow in the Tide of Harmful Indulgence. 86
Blood analyses following acacia-glucose injection 210
analysis in the estimation of renal failure 389
chemistry, the clinical application of... 826
gases, acid-base equilibrium in disease from the point of view of. 490
matching as a routine in pregnant patients 122
pressure and protein food. 326
and the non-protein nitrogen in the blood, effect of large amounts of fluid upon 558
during anesthesia 558
Blood pressure during intravenous injection of quinine. 339
during intravenous injection of quinine in the treatment of malarial fever 490
effect upon the injection of adrenalin in dementia præcox. 38
high—treatment of 114
in eclampsia, the reduction of. 434
in obstetrics, the value and significance of 359
the reduction of by benzyl benzoate 17
regeneration following simple anemia.. 42
sugar in diabetes. 362
transfusion in the treatment of pulmonary tuberculosis 418
via longitudinal sinus, with report of cases 643
volume, adjustment of after injection of isotonic solutions of varied composition 47
Body mass and metabolism, the internal pancreatic function in relation to. 508
Botulism, treatment in. 578
Breast-fed infants, treatment for colic in... 355
Breech presentation, the management of... 434
Bromide treatment in diseases of the nervous system, deleterious effects of the... 817
Bronchial asthma, etiology of 150 cases of.. 416
in childhood 52
response to pilocarpine and adrenalin in 512
the treatment of. 685
Bronchioles, action of adrenalin on the.... 39
Bronchopneumonia in infants, correct feeding in 423
Bronchoscopy, the use of narcotics in. 235
Burns from Roentgen rays. 61
treatment of 825
Bursitis, subdeltoid 441
Butter-flour food, a diet in infant feeding.. 773
mixture in the feeding of infants 877

Cæsarian section in the treatment of placenta prævia 865
twenty-one years' experience with 901
Calamine in the treatment of hemorrhoids. 572
Cancer, a new treatment of. 139
non-operative and post-operative treatment of 393
of the bladder. 65
of the breast, treatment of. 394
of the uterus, inoperable—treatment of 502
radium treatment of. 737
research 183
surgical treatment of—factors entering into delay in the. 30
treated by radium. 365
Capillary pressure and the circulation in shock 886
Carbohydrate assimilation, the influence of exercise on 508
feeding, prolonged—diseases of infants due to 553
Carbohydrates and alkalies in the treatment of typhoid and paratyphoid fever 682
prolonged intolerance to. 889
Carbolic acid in the treatment of erysipelas 809
Carbon dioxide after anesthesia and operation 510
monoxide asphyxia, studies in. 868
from the blood, a therapy for accelerating the elimination of. 47
Carbuncles, treatment of. 445
Carcinoma of the breast, radium and x-ray in 590
of the oral and laryngeal pharynx, the early diagnosis of. 292
of the prostate. 371
of the uterus. 397
Cardiac cycle, studies on the consecutive phases of the. 873
failure, acute—treatment of. 798
function, changes in produced by disease 781
massage 21
a case of. 425
in resuscitation. 514
stimulant, the value of squill as a. 95
Cardiology, clinical—practical gains of since 1900 416
Cardiovascular response to injections of adrenalin 107

Carminative action of volatile oils..... 34
volatile oils, effect of on the muscular movements of the intestine..... 257
Carrel-Dakin method in the treatment of empyema 410
Carriers of diphtheria, treatment of..... 250
Cascara sagrada, the action of..... 564
Castor oil—is it an oxytoxic?..... 403
Cataclysmal hemorrhage after tonsillectomy 654
Catalases of the blood, the influence of saccharin on the..... 129
Cataract, cause and treatment of..... 863
Catarrhal icterus, treatment of..... 543
Catharsis, preoperative 189
Causation of appendicitis..... 220
Caution in the diagnosis of diabetes..... 327
Cerebral hemorrhage in the new-born, surgical treatment for... 439
of the new-born..... 748
Cerebrospinal fluid in treated syphilis..... 582
pressure and brain volume, the effect of salt ingestion on 123
syphilis, a point in regard to the treatment of 328
sympathetic section for angina pectoris. 893
Chancroidal infections 871
Chaulmoogra oil in the treatment of tuberculosis 717
Chelidonin, the pharmacology of..... 260
Chemical and biological tests for vitamines 848
changes in the blood in disease..... 174
terms, spelling of..... 608
Chemotherapy, quantitative studies in..... 414
studies in—the oxidation of arsphenamine 128
Children's requirements as to food..... 283
Children, treatment of endocarditis in..... 498
Chloretone solution as a vehicle for bacterial vaccines 187
Chlorine as a therapeutic agent..... 156
Chloroform effects on ether hyperglycemia 413
Cholecystectomy with modified drainage... 435
Chronic pain, control of..... 905
Chrysarobin ointment in the treatment of psoriasis 116
Cinchophen, neocinchophen, and novaspirin in rheumatic fever 740
Circulatory conditions, benzyl benzoate in.. 17
Cirrhosis of liver, saphenoperitoneal anastomosis for ascites due to..... 457
Clinical application of blood chemistry..... 826
physiology, the progress of..... 630
reactions, the relation of arsphenamine serum precipitates to..... 591
use of radium..... 737
a report on the..... 313
value of intraperitoneal injections of salt solution 891
Clinic at the Jefferson Medical College Hospital 474
Cocaine, fifteen grains by the mouth—recovery 431
Cod-liver oil and butter, fat-soluble accessory factor in..... 566
Cold cautery treatment of uterine cancer... 502
Colds and coughs, treatment of..... 574
the treatment of..... 497
Colectomies for intestinal stasis, the end results of 518
Colic in breast-fed infants, treatment for.. 355
in the nursing infant, a method for the prevention of 131
Colitis, treatment of..... 814
Colonic infection, chronic—the Schellberg treatment for 803
Common affections, notes on treatment of... 167
Commoner obstetrical mistakes..... 570
Comparison of alcohol and caffeine..... 83
Complications observed in the treatment of angiomata with radium..... 146
Concussion of the spine..... 562
Congenital deformities, treatment of..... 306
syphilis, diagnosis and treatment of... 806
Conjugal neurosyphilis 784
Conjunctival infections, mercurochrome-220 in 107
Conjunctivitis, rheumatismal—treatment of 167
Conquest of venereal infection..... 214
Consanguineous marriages and inbreeding, the effects of..... 219
Conservative tendencies in modern gynecologic therapy 797
treatment of eclampsia..... 426
Constipation, spastic 34
Control of venereal disease..... 376
Corpus luteum extract in nausea of pregnancy 652
treatment of hyperthyroidism.. 119
Cresol, a valuable disinfectant for use in the field 71
Critical comment on current methods of public education in venereal disease..... 535
Crucial points in surgery of the gall-bladder and ducts 284
Cumston, Charles Greene: Notes on Treatment of Some Common Affections.... 167
Random Notes on Treatment..... 540
Curette, use and misuse of the..... 444
Cutaneous anthrax 362
treatment of 824
Czerny-Kleinschmidt butter-flour food, experiences with the mixture in the feeding of infants.... 773 877

Da Costa, John Chalmers: Address Presenting Memorial Tablet to Jefferson Medical College, October 7, 1920..... 10
Dakin's solution in the treatment of empyema 29
Davis, Edward P.: The Diagnosis and Treatment of Conditions of the Heart Complicating Pregnancy 240
Deafness during early life, needed measures for the prevention of..... 892
Death under anesthesia, resuscitation in.... 275
Deaver, John B.: Truths and Fallacies About Appendicitis 229
Decapsulation of the kidneys.....95, 479
Deep radiotherapy 526
Defects in obstetric teaching..... 790
Deformities, acquired, in children—treatment of 306
Delayed arsenical poisoning, a case of..... 510
Dementia præcox, effect upon the blood pressure of the injection of adrenalin in.. 38
Dermatitis and allied reactions following the arsenical treatment of syphilis..... 792
Dermatological therapeutics, don'ts in..... 349
Dermatology, practical therapeutics in..... 198
Desiccation treatment of hemorrhoids and anal fissures 812
Diabetes, caution in the diagnosis of..... 327
experimental studies in..... 352
insipidus and the pituitary..... 571
antidiuretic effect of pituitrin in... 664
as a hypopituitary syndrome..... 584
pituitary extract and histamine in a case of 565
treated with pituitrin..... 423
mellitus, the prevention of..... 123
the proper attitude as to..... 699
the blood sugar in..... 362
acidosis 728
Diagnosis and indications for operation in acute mastoiditis 831
and treatment of hyperthyroidism..... 39
of myocardial insufficiency..... 175
Diarrhea in infancy, water treatment of... 639
in infants, treatment of..... 643
Diary of Robert Battey, M.D..... 612
Diet as a postoperative factor in gastro-intestinal disorders 422
Diet in infant feeding, action of the different elements of—experiences with the Czerny-Kleinschmidt butter-flour food 773
in the treatment of glycosuria..... 724
Dietetic treatment of acid intoxication..... 344
Differential diagnosis between disorders of the pelvic organs in women and of the abdominal viscera 202
Digitaline, the use and proper dose of..... 533
Digitalis and atropine, the action of on the peripheral blood-pressure 727
and diphtheria 251
in the treatment of heart affections.... 642
in the treatment of pneumonia..... 337
the effect of high temperature on the action of 20
Dilatation of the heart, acute..... 97
of the stomach, acute postoperative.... 801
Diphtheria bacilli, virulent, carried by cats 147
diagnosis and treatment of..... 885
—does a negative Schick test indicate present and future security from?.... 734
eradication of by means of toxin-antitoxin following Schick testing..... 711
immunization 609
importance of the Schick test in the prevention of 177

Diphtheria, prophylaxis of sudden death in. 168
some additional measures against..... 250
swollen glands and heart block in..... 573
the prevention of 720
the diagnosis and treatment of..... 507
the Schick test, its control, and active immunization against 43
the use of digitalis in..... 251
Disease, chemical changes in the blood in.. 174
Diseases of childhood, use of water in the.. 131
of the endocrine glands, the diagnosis and treatment of..... 356
Disorders of infancy, therapeutics of thick cereals in 118
Displacement of the uterus, treatment of.. 202
Disturbed reflexes in the production of symptoms of disease, the theory of..... 506
Diuresis, the influence of on the elimination of urea, creatinine, and chlorides..... 126
Diuretic action of pituitrin..... 659
Don'ts in dermatological therapeutics..... 349
Drainage in empyema, principles of..... 378
in the treatment of ascites..... 248
Dried milk powder in infant feeding..... 645
Dropped kidney and enteroptosis: a new method of treatment..... 870
Drug absorption, influence of the electric current on 739
armamentarium of the endoscopist.... 234
Duodenal and gastric ulcers.....137, 345
ulcer, treatment of..... 492
ulcers, surgical treatment of..... 98
Duodenum, pathological conditions of the.. 599
Dupuytren's contracture of the fingers..... 907
Dysentery, amebic, in Siam..... 492
protozoal, and benzyl benzoate..... 282
treatment of with emetine..... 788
Dyspepsia and malassimilation in children.. 574
D'Zmura, Andrew P.: Mechanical Aspects of Acquired Chronic Valvular Heart Disease 841

Ear infections, acute—a study of..... 515
Early diagnosis of acute abdominal infections 742
of carcinoma of the oral and laryngeal pharynx 292
neurosyphilis, responsibility of intensive treatment methods to the incidence of 718
Ebb and flow in the tide of harmful indulgence 86
Eclampsia and its conservative treatment.. 426
the reduction of blood pressure in..... 434
the treatment of 503
Eczema, infantile—relation of food to..... 258
of the scalp, infantile—an ointment for. 198
Effect of tobacco on man..... 727
of large amounts of fluid upon blood pressure and the non-protein nitrogen in the blood..... 558
Effects of injections of quinine and its adequate dosage 481
Efficiency and atmospheric conditions..... 715
of deep injections of mercurial preparations in syphilis..... 247
Electrical methods in the treatment of urinary incontinence 827
Electric current, influence of on the absorption of drugs..... 739
Electrocardiograms, the value of in heart disease 845
Electrolysis in the treatment of hemorrhoids 596, 810
Emetine in the treatment of dysentery..... 788
Emmenagogue oils, action of on human uterus 417
Emmett, A. D.: The Vitamines and Their Relationship to Health and Disease..768, 847
Empyema in children 410
in infants and young children..... 342
principles of drainage in..... 378
treatment of 27
Encephalitis lithargica, personal precautions against 585
Endocarditis, acute, in children..... 498
Endocrine gland in the treatment of the neuroses 411
glands, diseases of the diagnosis and treatment of 356
Endocrines in gynecology..... 196
End results and mortality in surgery..... 407
of colectomies for intestinal stasis. 518
of tonsillectomy 281
Endoscopist, the drug armamentarium of the 234
Energy expenditure in work, influence of diet on the..... 501
Enteroptosis and dropped kidney: a new method of treatment..... 870
posture a cause and a remedy in..... 381
Enuresis, nocturnal—treatment of..... 171
treatment of 822
Epidemic acid intoxication..... 344
Epilepsy and neurasthenia, appendicostomy and cecostomy for intestinal stasis in 59
luminal in the treatment of.....348, 837
recent advances in the treatment of... 723
sodium biborate in the treatment of.... 126
treated with luminal, analysis of more than 200 cases of..... 714
Epinephrine in the treatment of asthma... 685
Epithelioma of the face, radium treatment of 315
of the lip treated by x-ray after operation 393
radium treatment of..... 737
Eradication of diphtheria by means of toxin-antitoxin following Schick testing.. 711
Errors in the diagnosis and treatment of myocardial insufficiency 133
Error in the dose of arsphenamine..... 911
Erysipelas, the treatment of..... 809
Ether hyperglycemia, effect of chloroform on 413
vapor, explosion of during laryngoscopy 657
Ethyl chloride as an anesthetic..... 269
Ethylhydrocuprein hydrochloride, intrapleural injections of 892
Etiology of 150 cases of bronchial asthma.. 416
Exophthalmic goitre and surgery..... 581
cases examined for the oculo-cardiac reflex 622
results of surgical treatment of 63
the treatment of..... 629
of by radiations. 204
Experimental investigation of the results of linear division of the pyloric sphincter 522
studies in diabetes..... 352
of the pharmacology of quinidine.. 817
Explosion of ether vapor during laryngoscopy 657
Extrapleural thoracoplasty in the treatment of pulmonary tuberculosis..... 144
Eye injuries in industrial plants..... 366

Factors entering into delay in the surgical treatment of cancer..... 30
Farmers and the freight rates..... 911
Fatal postarsphenamine jaundice..... 135
Fatigue, the influence of alcohol on..... 271
Fat necrosis of the female breast, traumatic, and its differentiation from carcinoma... 224
Fat-soluble accessory factor in cod-liver oil and butter 566
A vitamine, test for..... 849
Feeding infants with the Czerny and Kleinschmidt butter-flour mixture..... 877
of infants, simplified..... 360
of normal infants..... 194
with excess of carbohydrates, prolonged —diseases of infants due to..... 553
Femur, the abduction treatment of fracture of the neck of..... 329
ununited fracture of the neck of—reconstruction operation 819
Fibrillation and flutter, auricular..... 717
Fibroids of the uterus, radium in the treatment of 315
Filariasis, the uselessness of antimony in the treatment of..... 112
Fistulæ of the neck of dental origin, treatment of 544
Flatfoot and rheumatism..... 857
a simple method of treating..... 376
Fluid in the pericardium, the mechanical effect of on the function of the heart.... 277
Food requirements of children..... 283
values in tuberculosis..... 188
Foot abnormalities and their management. 211
Foot-muscle exercise in the treatment of flatfoot 376
"Forage" of the prostate, results of..... 588
Foreign bodies in the air and food passages, symptomatology and diagnosis of... 750
proteins in the treatment of chronic arthritis, the value of..... 701
Forms of hyperthyroidism..... 556
Fracture of the skull..... 897
sprains 364

Fractures, recent considerations in the management of 367
treatment of 674
Free salicylic acid liberated from sodium salicylate in the circulation..... 698
Freight rates and the farmers..... 911
Frequent types of nasal obstruction and their treatment 186
Fresh citrated blood in the treatment of melena neonatorum 209
Friedmann's method in the treatment of tuberculosis 363
Frontal sinus, intranasal drainage of through the natural opening..... 264
Functional kidney test, indigo-carmine as a tests of renal capacity..... 390
Funk, Elmer H., and Vaughn, Arthur R.: The Treatment of Bronchial Asthma..... 685

Gall-bladder, a hitherto overlooked function of the 858
and ducts, crucial points in surgery of the 284
Gastric and duodenal ulcer, treatment of.. 492
ulcers 137, 345
crises, the spinal sign in..... 141
dilatation in pneumonia in children.... 255
treatment of by lavage..... 801
ulcer, treatment of.....751, 821
cause and relief of pain in..... 513
surgical treatment of..... 98
Gastrointestinal disorders, sodium bicarbonate in 342
the diet as a postoperative factor in. 422
Gastroptosis, the problem of..... 649
Generalized psoriasis, treatment of..... 116
Gelatin in the treatment of chloroform injury 741
Genito-urinary organs, absorption of local anesthetics through the..... 415
surgery, sacral anesthesia as applied to 823
Gland and vaccine therapy in various disorders 15
Glucose in the treatment of pneumonia.... 93
studies on renal threshold for..... 513
the value of by rectum..... 19
Glycemia and glycosuria..... 724
Goitre, treatment of..... 732
of certain types of..... 428
of with radium..... 127
various operative procedures indicated by 898
Goitres, soft—sodium iodide and thyroid extract in 900
Gonorrhea in women, treatment of..... 42
serum treatment of..... 488
the abortive treatment of..... 525
vaccine therapy in..... 739
Gordon, Alfred: The Oculo-cardiac Reflex and its Therapeutic Value..... 621
Graves's disease, treatment of..... 54
Griffith, J. P. Crozer: The Action of the Different Elements of Diet in Infant Feeding—Experiences with the Czerny-Kleinschmidt Butter-flour Food..... 773
Griffith, J. P.: Saphenoperitoneal Anastomosis for Ascites, Due to Cirrhosis of Liver 457
Growing children, spinal curvature in..... 668
Guaiacol in the treatment of malaria..... 608
Gynecologic diseases, non-malignant—radiotherapy in 799
therapy, modern—conservative tendencies in 797
Gynocology, the endocrines in..... 196

Halldorson, M. B.: Chlorine as a Therapeutic Agent 156
Hand infections, acute, and their surgical treatment 181
Hare, Hobart Amory: A Clinic at the Jefferson Medical College Hospital..... 474
The Aims and Duties of the Student... 162
The Treatment of the Various Types of Nephritis—a Clinical Lecture..... 624
Harmful indulgence, the ebb and flow in the tide of..... 86
Hay fever, seasonal—treatment of..... 641
Heart, action of adrenalin on the..... 260
acute dilatation of the..... 97
block and swollen glands in diphtheria 573
cases and the war..... 49
conditions complicating pregnancy, the diagnosis and treatment of..... 240
Heart disease, chronic valvular—mechanical aspects of acquired..... 841
effects of tobacco on the..... 632
failure, cardiac massage in..... 21
treatment of 798
function, the mechanical effect of fluid in the pericardium on..... 277
management of in pneumonia..... 337
massage, a case of..... 425
and resuscitation..... 419
in surgery with reference to case resuscitated by a new technique. 356
routes of access to the..... 592
syphilis 719
Heliotherapy in the treatment of surgical affections 786
Heller, Edward P.: The Use of Acetylsalicylic Acid Locally after Tonsillectomy, and in Acute Pharyngitis..... 840
Hemorrhage and shock, traumatic—indications for infusion of blood substitutes and transfusion of blood in cases of. 713
antepartum—the treatment of..... 206
cerebral, in the new-born—surgical treatment for 439
of the new-born..... 748
following hemorrhoid operation..... 61
uterine, not associated with pregnancy, the treatment of..... 568
—the use of pituitrin by mouth in certain cases of..... 741
Hemorrhoids and anal fissures, with reference to the desiccation method of treatment 812
operation on followed by hemorrhage.. 61
the cure of without operation..... 572
treatment of by electrolysis.....596, 810
Hernia, cure of by vaccine..... 456
strangulated, in the aged..... 601
umbilical and ventral..... 289
Hiccough, ocular compression for..... 624
Hidden sepsis 286
High blood pressure..... 114
High temperature, the effect of on the action of digitalis..... 20
tracheotomy and other errors the chief causes of chronic laryngeal stenosis.. 679
Hip dislocations, old—reduction of by open incision 220
pains, senile—treatment of..... 366
tuberculosis 135
Hip-joint diseases, treatment of..... 311
Histologic changes in organs induced by arsphenamine, neoarsphenamine, and mercury 660
Hitherto overlooked function of the gall-bladder 858
Hollingworth, H. L.: A Comparison of Alcohol and Caffeine..... 83
Honey, vitamine content of..... 714
Hookworm infection in Brazil, studies on.. 573
Hour-glass stomach, fifty cases of..... 828
Human heart, the action of digitalis on.... 811
Human uterus, action of emmenagogue on. 417
Hydronephrosis, intermittent 603
Hyoscines and hyoscyamines..... 510
Hyperesthesia of the vesical neck in women 367
Hypersensitiveness to serum, testing for the presence or absence of..... 736
Hyperthyroidism, diagnosis and treatment of 39
forms of 556
surgical treatment of..... 732
the corpus luteum treatment of..... 119
the relation of to adrenalin hypersensitiveness 650
Hypertrophic stenosis of the pylorus, congenital—treatment of by Rammstedt's operation 667
Hypertrophied tonsils, the radiation treatment of 903
Hypertrophy of the thyroid, the effect of thyroid, thymus and tethelin and a meat diet on 185
Hypopituitary syndrome, diabetes insipidus as a 584

Illuminating gas as a factor in ill health.. 180
Immunity in surgery..... 677
Importance of lead as a poison in obscure cases 179
Improved method in the treatment of otitis externa 124
Inbreeding and consanguineous marriages, the effects of..... 219
Indigo-carmine as a functional kidney test. 40

Indications for lumbar puncture..... 360
for spinal drainage in certain mental diseases 350
for the treatment of acute appendicitis, from the standpoint of the surgeon.. 153
Induced pneumothorax in the treatment of pulmonary tuberculosis 648
Induction of abortion 512
of premature labor..... 68
Industrial medicine—its relation to tuberculosis 262
Infant feeding, action of the different elements of diet in..... 773
and bronchopneumonia, management of difficult cases of.. 423
dried milk powder in..... 645
simplified 360
Infantile diarrhea, treatment of..... 643
water treatment of..... 639
diseases due to prolonged feeding with excess of carbohydrates..... 553
disorders, therapeutics of thick cereals in 118
eczema, relation of food to..... 258
marasmus, bile salts in..... 514
scurvy 410
spinal paralysis 308
Infections of the ear, acute—a study of.... 515
septic—doubt as to the nature of..... 286
Infective arthritis and allied conditions.... 807
Inflammation of the nasal accessory sinuses 336
Influence of diet on the energy expenditure in work 501
of dilution on the toxicity of alcohol 192, 272
Influenza followed by pneumonia in the camps in the United States..... 655
vaccination against, and some other respiratory infections 713
vaccine therapy in..... 15
value of vaccine treatment in..... 650
Infratonsillar nodules, retention crypts in the as extensive harbors of pathogenic bacteria 267
Infusion of blood substitutes and transfusion of blood in cases of traumatic hemorrhage and shock, indications for..... 713
Injection treatment of piles..... 800
Injuries to the ankle joint and their treatment 374
to the eye in industrial plants..... 366
Inoperable uterine cancer, treatment of.... 502
Insomnia, nervous—treatment of..... 497
Intensive administration of arsphenamine.. 134
Intermittent hydronephrosis 603
Internal pancreatic function in relation to body mass and metabolism 508
Interperitoneal adhesions, the origin and prevention of 112
Interstitial nephritis, a case of..... 628
Intestinal extraction of adsorbed alkaloids. 49
obstruction, acute 680
stasis 50
in epilepsy and neurasthenia, appendicostomy and cecostomy for. 59
the end results of colectomies for.. 518
tuberculosis 884
Intolerance to aspirin, a case of..... 492
Intracistern injections of salvarsanized serum in neurosyphilis 91
Intramuscular (epifascial) injection, a technique of 661
Intranasal drainage of the frontal sinus through the natural opening..... 264
Intraperitoneal injection 782
of salt solution, the clinical value of..... 891
Intravenous administration of arsphenamine in non-syphilitic persons, reactions following the 352
use of corpus luteum extract in nausea of pregnancy 652
Intussusception, results of operations for.. 895
Iodide of potassium in the treatment of arteriosclerosis 197
Iodoform poisoning 208
Iron in secondary anemia, the value of..... 783
Isotonic solutions of varied composition, adjustment of blood volume after injection of 47

Jackson, Chevalier, and Spencer, William H.: The Drug Armamentarium of the Endoscopist 234
Jackson, J. Allen, and Free, George B. M.: Observations of the Continued Use of Luminal in Individual Cases of Epilepsy. 837
Jackson, J. Allen, and Perkins, R. J.: Diphtheria Immunization 609
Jaundice, fatal postarsphenamine..... 135
Juice of lemon, preservation of..... 258

Kata-thermometer, for estimating the effect of atmospheric conditions upon output and fatigue 715
Kelly, Howard A.: A Diary of Robert Battey, M.D. 612
Uterine Polyps 761
Kelly, Howard A., and Fricke, Robert E.: The Use of Pessaries..... 5
Keloids, radium in the treatment of..... 865
Keratosis, radium treatment of..... 737
Kidney decapsulation 95, 479
for the treatment of subacute nephritis 272
stone, operation for..... 439
test, functional—indigo-carmine as a.. 40
Klebs-Loeffler vaccine in the treatment of diphtheria carriers 251
Knife cautery in surgery of the thorax.... 223
Knowles, Frank Crozer: The Modern Treatment of Syphilis..... 320

Labor, a plea for the rectal examination in premature—the induction of..... 34 68
scopolamine-morphine in, called twilight sleep 280
the use of morphine in..... 509
Laboratory contributions to surgery..... 102
Lactic acid milk..... 117
Lanolin and boric acid, the use of in abdominal sections 112
Laryngeal diphtheria, antitoxin in the treatment of 507
stenosis, chronic—high tracheotomy and other errors the chief causes of..... 679
Laryngoscopy, explosion of ether vapor during 657
Latency of syphilis..... 560
Lavage in the treatment of postoperative dilatation of the stomach..... 801
Law of the heart..... 888
Lead as a poison in obscure cases, the importance of 179
poisoning, an unusual case of..... 152
chronic, in the printing presses of Calcutta 808
Lemon juice, preservation of..... 258
Lesions of the upper abdomen, the significance of shoulder pain in..... 520
Liberation of free salicylic acid from sodium salicylate in the circulation..... 698
Light and heat in the treatment of surgical affections 786
Linear division of the pyloric sphincter, experimental investigation of the results of 522
Lip disease, malignant..... 222
Liver regeneration following chloroform injury as influenced by the feeding of casein of gelatin..... 741
Lobar pneumonia, serum treatment of..... 737
treatment and management of. 726
Local anesthesia, an estimate of the value of in the surgery of to-day... 830
for extensive abdominal operations 833
for mastoidectomy 437
problem, present status of the. 745
Lost and found radium..... 835
Lowenburg, Harry: The Frequency of Pyelitis in its Relation to the Nosology of So-called Obscure Temperatures in Infants 460
Low protein diet in skin diseases, a menace in the 117
temperatures and cold baths in increasing the oxidative processes, mode of action of 816
Luetin test for syphilis..... 780
Lumbago as related to railroad injuries... 142
Lumbar puncture, indications for..... 360
Luminal, epilepsy treated with..... 348
in individual cases of epilepsy, observations of the continued use of..... 837
in the treatment of epilepsy.....714, 723
Lung and pleura, surgery of the..... 705
mapping by the injection of bismuth mixtures in the living..... 316

Magnesium sulphate in arsenic poisoning.. 586
Malarial fever, blood pressure during intravenous injection of quinine in the treatment of..... 490
in pregnant females, treatment of 432

Malarial fever, quinine injections in..... 481
treatment of in individuals susceptible to attacks of blackwater fever by intravenous injection of an antihemolytic quinine solution 813
infection, the use of preparations other than quinine for..... 399
Malaria, recurrent—treatment of by novarsenobenzol 55
the action of quinine on the pregnant uterus in 505
the use of guaiacol in..... 608
treatment of by continuous doses of quinine 874
Malassimilation and dyspepsia in children.. 574
Malignant disease in the lip and jaw..... 222
radium and the x-ray in the treatment of 895
treatment of with special reference to radium in needles 499
growths of the upper jaw and antrum.. 519
Malpractice cases, res ipsa loquitur in..... 530
Management of strictures..... 1
Marasmus, infantile—bile salts in..... 514
Massage of the heart and resuscitation.... 419
Massive infection of a vaccinated person with bacillus typhosus..... 511
Mastoidectomy under local anesthesia..... 437
Mastoiditis, acute—diagnosis and indications for operation in.... 831
—treatment of 36
Meatotomy, technique of..... 525
Mechanical aspects of acquired chronic valvular heart disease..... 841
effect of fluid in the pericardium on the function of the heart..... 277
Medical care of the new-born infant..... 266
drainage of the biliary tract..... 430
student, the aims and duties of the..... 162
Megalocolon, surgical treatment of..... 447
Melena neonatorum treated by injection of fresh citrated blood..... 209
Memorial tablet presented to Jefferson Medical College 10
Meningeal phenomena in apical pneumonia, treatment of 540
Meningitis and pneumonia, serums in the treatment of epidemic..... 102
Mental activities, the influence of alcohol on 271
diseases, indications for spinal drainage in 350
Mercurial preparations in syphilis, the efficiency of deep injections of 247
relative efficiency of the different 46
Mercurochrome-220: its use in ophthalmology 107
Mercury salicylate, the effect of on the Wassermann reaction 119
Methyl alcohol poisoning, acute—treatment of 106, 796
Mild chronic nephritis in children..... 32
contusions of the abdomen..... 602
Mills, H. Brooker: Prognosis and Treatment of Scarlet Fever 322
Missile in the right ventricle of the heart, removal of, with recovery..... 70
Mitral stenosis, auricular fibrillation, and the action of digitalis..... 642
Mobile V colon..... 757
Modern methods in the diagnosis of renal disorders, a brief review of..... 387
radiotherapy, some uses of..... 712
treatment of acne..... 431
of syphilis 320
of the nervous system..... 291
Modified drainage in cholecystectomy..... 435
Mohler, Henry K.: Baral Metabolism—Its Application to Internal Medicine..... 690
Morphia, its compounds, and derivatives—simple detection and qualitative tests for 656
Morphine in labor..... 509
Mortality and end-results in surgery..... 407
Mouth disinfectant, tobacco smoke as a.... 256
Mucous colitis, treatment of..... 577
Muscular movements of the intestine, effect of carminative volatile oils on the..... 257
Mutism, postanesthetic..... 361
Myocardial insufficiency, diagnosis and treatment of 175
errors in the diagnosis and treatment of..... 133
Myositis, neuritis, and arthritis—an analysis of the end results of treated septic 261
Myxedema, thyroid gland in the treatment of 358

Nail ringworm, treatment of..... 834
Napoleon, the character of..... 531
Narcotics, the use of in bronchoscopy..... 235
Nasal accessory sinuses, inflammation of the 336
and postnasal disorders and chilling of the surface, the relation between.... 859
cavities and asthma..... 417
deformities due to the submucous operation 297
obstruction, frequent types of and their treatment 186
sinusitis, acute—the treatment of..... 414
Nasociliary neuralgia 58
Nausea of pregnancy, corpus luteum extract in 652
Needed measures for the prevention of deafness during early life..... 892
Need of vitamines..... 268
Negative Schick test—does it indicate present and future security from diphtheria?.. 734
Neoarsphenamine, massive doses of by rectum 565
Nephritis, acute, from bichloride of mercury 467
intercurrent 469
chronic—treatment of..... 730
with associated cardiovascular disease 470
with uremia..... 471
in children, mild chronic..... 32
primary acute..... 468
subacute—treatment of by kidney decapsulation 272
treatment of..... 401
of the various types of—a clinical lecture 625
Nervous insomnia, treatment of..... 497
system, diseases of the—deleterious effects of the bromide treatment in.. 817
Neuralgia, nasociliary..... 58
Neurological surgery..... 708
special field of..... 636
Neuroses and their treatment..... 411
Neurosyphilis, conjugal..... 784
early—responsibility of intensive treatment methods to the incidence of.... 718
intracistern injections of salvarsanized serum in 91
recognizing and treating in the early period of the infection..... 654
Nevi, the radium treatment of..... 589
vascular—treatment of with radium.... 219
New-born, cerebral hemorrhage of the..... 748
infant, medical care of the..... 266
New principle in surgery of the large intestine 215
method in the treatment of typhoid and paratyphoid fever 682
Newcomet, W. S.: A Report on the Clinical Use of Radium..... 313
Nitrous-oxide-oxygen analgesia and anesthesia in obstetrics..... 569
anesthesia, the open method of 68
Nocturnal enuresis, treatment of..... 171
Non-operative and postoperative treatment of cancer 393
Non-syphilitic persons, reactions following the intravenous administration of arsphenamine in 352
Normal infants, the feeding of..... 194
ox serum in the treatment of anthrax.. 354
Nose, throat and mouth surgery, a protest against radicalism in..... 649
Notes on treatment of some common affections 167
Novarsenobenzol in the treatment of recurrent malaria 55
Nursing and hygiene of importance in mild chronic nephritis in children..... 32
infant, a method for the prevention of colic in the 131
Nutrition, the problem of and vitamines... 768
Nutritive value of soya-bean flour as a supplement to wheat flour.. 665
of yeast in bread..... 720

Observations of an anesthetist..... 265
of the continued use of luminal in individual cases of epilepsy..... 837
Obstetrical mistakes, the commoner..... 570
practice, recent advances in..... 200
Obstetrics, anesthesia in..... 665

Obstetrics, nitrous-oxide-oxygen analgesia and anesthesia in..... 569
rectal examination in..... 208
spinal anesthesia in..... 110
the value and significance of blood pressure in 359
twilight sleep in..... 555
Obstetric teaching, defects in..... 790
Ochsner, Albert J.: The Treatment of Acute Appendicitis 77
Ocular accidents attributed to arsenical products 121
Oculo-cardiac reflex and its therapeutic value 621
Oil of chenopodium in the treatment of hookworm infection 573
Ointment for the treatment of burns..... 825
Old dislocations of the hip, reduction of by open incision 220
Open method of nitrous-oxide-oxygen anesthesia 68
Operative and non-operative treatment of tuberculosis of the spine..... 66
Oral administration of pituitary extract... 793
Orange beverages for medicinal purposes, warning against 269
juice in the feeding of infants..... 194
Origin and prevention of interperitoneal adhesions 112
Orthopedic surgeon, necessary qualifications for the 252
surgery and industrial surgery of the extremities and spinal column, the standardization of methods of treatment in 593
of interest to the general practitioner 305
Otitis externa, an improved method in the treatment of 124
Otolaryngology, the use of suction in—technique of application..... 80
Ovarian substance, the use of..... 566
Oxidative processes, mode of action of low temperatures and cold baths in increasing the 816
Ox serum, normal, in the treatment of anthrax 354
Oxytoxic, castor oil as an..... 403

Pain, chronic—control of..... 905
in gastric ulcer, cause and relief of... 513
in the abdomen in children, the diagnosis of 404
in the right iliac fossa and the end-results 487
Pancreatic extract in the treatment of sprue 646
Parenchymatous nephritis, a case of..... 626
Paresis treatment by arsphenamine and mercury 869
Passing of the septic hand..... 270
Pathological conditions of the duodenum.. 599
Paths of spread of bacterial exotoxins.... 60
Patterson, Ross V., and Jones, Harold W.: A Brief Review of Modern Methods in the Diagnosis of Renal Disorders..... 387
Patterson, Ross V., and Jones, Harold W.: A Series of Cases Illustrating the Use of Various Tests in the Study of Renal Diseases 467
Pediatric practice, benzyl benzoate in..... 342
Pelvic cavity inflation, the x-ray after..... 894
organs in women, disorders of the—differential diagnosis between and of the abdominal viscera..... 202
Peripheral blood-pressure, the action of digitalis and atropine on the..... 727
Peritonitis, treatment of..... 406
Pernicious anemia and its treatment..... 879
a study of..... 279
treatment of by splenectomy. 432
Personal precautions against encephalitis lethargica 585
Pessaries, the use of..... 5
Pfahler, George E.: Non-operative and Postoperative Treatment of Cancer..... 393
Pharmacological action of salvarsan..... 277
Pharmacology of chelidonin, a neglected alkaloid 260
Pharyngitis, acute—acetylsalicylic acid in.. 840
Piles, treatment of without operation..... 800
Pilocarpine and adrenalin in bronchial asthma 512
Pituitary extract and histamine in a case of diabetes insipidus..... 565
Pituitary extract, effect of on the rate of urine formation in man 740
in the treatment of diabetes insipidus 571
the oral administration of.... 793
the use of..... 634
polyuria or diabetes insipidus..... 423
Pituitrin by mouth in certain cases of uterine hemorrhage 741
in diabetes insipidus, the antidiuretic effect of 664
the diuretic action of..... 659
Placental gland and placental extract..... 203
Placenta prævia, the treatment of..... 865
Pleural reflex 372
Pneumonia, chlorine in the treatment of... 156
following influenza in the camps in the United States 655
glucose in the treatment of..... 93
in children, gastric dilatation in..... 255
lobar—serum treatment of..... 737
—treatment and management of..... 726
management of the heart in..... 337
treatment of the toxemia of..... 795
Pneumo-peritoneal Roentgen-ray diagnosis 882
Pneumothorax, artificial—important considerations in the administration of.... 478
induced—the results of in the treatment of pulmonary tuberculosis..... 137
Poisoning, arsenical—a case of delayed.. 510
by arsenic, chronic—scleroderma as a possible manifestation of.... 359
magnesium sulphate in..... 586
by iodoform 208
by lead, an unusual case of..... 152
chronic, in the printing presses of Calcutta 808
by methyl alcohol, acute..... 106
—treatment of .. 796
from ethyl chloride anesthesia..... 269
unusual forms of..... 484
Pollen treatment of seasonal hay fever.... 641
Polyps, uterine—operation for..... 761
Polyvalent antimeningococcus serum, the potency of 340
Postanesthetic mutism 361
Postoperative morbidity in its relation to anesthesia 754
Posture a cause and a remedy in enteroptosis 381
Practical gains of clinical cardiology since 1900 416
therapeutics in dermatology..... 198
Pregnancy, conditions of the heart complicating—the diagnosis and treatment of 240
early and late—treatment of the toxemia of 789
nausea of—use of corpus luteum extract in 652
sodium bicarbonate tolerance in the toxemias of 281
vomiting in—treatment of by adrenalin 649
Pregnant and non-pregnant uterus, action of quinine on in the tropics..... 796
females suffering from malarial fever, treatment of 433
patients, blood matching as a routine in 122
Premature labor, the induction of..... 68
Preoperative catharsis 189
Preparations other than quinine for malarial infection, the use of..... 399
Present status of radium and Roentgen therapy 895
status of the local anesthesia problem.. 745
Prevention of acute arsphenamine reaction by antianaphylaxis and atropine.... 720
of diabetes mellitus..... 123
of diphtheria 720
Prognosis and treatment of scarlet fever.. 322
Progress of clinical physiology..... 630
Prolonged intolerance to carbohydrates.... 889
Proper attitude as to diabetes mellitus..... 699
Prophylaxis and serum therapy of yellow fever 854
in venereal disease..... 254
of syphilis 178
Prostate and seminal vesicles, rôle of the in arthritis 743
Prostatic carcinoma 371
Protection of the public against syphilis... 659
Protein food and blood pressure..... 326
therapy, non-specific, in arthritis..... 477
Protozoal dysentery and benzyl benzoate... 282
Provocative procedures in the diagnosis of syphilis 48

Pruritus ani, treatment of..... 645
Psoriasis, generalized—treatment of..... 116
Psychotherapy of tuberculosis..... 890
Public education in venereal disease, critical comment on current methods of..... 535
Puerperal infection, prevention and treatment of 744
the prevention of..... 722
sepsis and its treatment..... 108
Pulmonary abscess, a case of..... 474
gangrene in children, treatment of.... 542
tuberculosis, blood transfusion in the treatment of 418
certain points in the diagnosis and treatment of..... 56
—chlorine in the treatment of... 156
extrapleural thoracoplasty in the treatment of 144
induced pneumothorax in the treatment of 648
the results of induced pneumothorax in the treatment of..... 137
the x-ray as a guide for producing pneumothorax in..... 148
Pyelitis, the frequency of in its relation to the nosology of so-called obscure temperatures in infants..... 460
Pyelography, sodium bromide solution in... 878
Pyloric sphincter, linear division of the—experimental investigation of the results of..... 522
section, improved incision for.. 324
stenosis in infants..... 128
Rammstedt's operation for..... 667

Qualitative tests for morphia, its compounds, and derivatives..... 656
Quantitative studies in chemotherapy..... 414
in chemotherapy—the oxidation of arsphenamine 128
Quinidine, experimental studies of the pharcology of 817
sulphate in auricular fibrillation 855
Quinine action on pregnant and non-pregnant uterus in the tropics..... 796
continuous doses of in the treatment of malaria 874
injections in the treatment of malarial fever, blood pressure during... 490
intravenous—blood pressure during 339
in the treatment of malaria in pregnant females 433
solution, hemolytic, in the treatment of malarial fever in individuals susceptible to blackwater fever..... 813
the action of on the pregnant uterus in malaria 505
the effects of injections of and its adequate dosage 481

Radiant light and heat in the treatment of colds 497
Radiation in the treatment of exophthalmic goitre 204
treatment of hypertrophied tonsils..... 903
Radicalism in surgery of the nose, throat, and mouth, a protest against..... 649
Radiotherapy, deep 526
in non-malignant gynecologic diseases. 799
modern—some uses of..... 712
Radium and nevus..... 589
and Roentgen therapy, the present status of 895
and x-ray in carcinoma of the breast.. 590
a report on the clinical use of..... 313
in needles in the treatment of malignant disease 499
in the treatment of cancer..... 365
of goitre 127
of keloids 865
of sarcoma and carcinoma of the bone..... 524
of vascular nevi..... 219
temporary loss of..... 835
the clinical use of..... 737
treatment of angiomata—complications observed 146
of diseases of the endocrine glands 356
of x-ray burns..... 215
Railroad injuries, lumbago as related to... 142
Rammstedt's operation in the treatment of congenital hypertrophic stenosis of the pylorus 667
Random notes on treatment..... 540
Rational measures in renal disease..... 401
Recent advances in obstetrical practice.... 200
in the treatment of epilepsy.. 723
considerations in the management of fractures 367
Recognizing and treating neurosyphilis in the early period of the infection..... 654
Reconstruction operation of ununited fracture of the neck of the femur..... 819
Recovery from fifteen grains of cocaine by the mouth 431
Rectal examination in labor, a plea for the. 34
in obstetrics 208
injection of glucose, the value of..... 19
of massive doses of neoarsphenamine 565
of salvarsan in the form of enteroclysis 44
Recurrent malaria, treatment of by novarsenobenzol 55
Reduction of blood-pressure in eclampsia... 434
of old dislocations of the hip by open incision 220
Regional anesthesia with special reference to splanchnic analgesia..... 521
Reinfection and curability of syphilis..... 116
Rejuvenation operations 332
Relation between chilling of the surface and nasal and postnasal disorders.... 859
of food to infantile eczema..... 258
Relative efficiency of the different mercurial preparations 46
Removal of adenoids in infancy..... 203
of missile from the right ventricle of the heart, with recovery..... 70
Renal calculi, operation for..... 438
complications of acute lacunar tonsillitis 365
disease from the medical standpoint with particular reference to classification and treatment..... 397
rational measures in..... 401
diseases, a series of cases illustrating the use of various tests in the study of 467
disorders, a brief review of modern methods in the diagnosis of..... 387
threshold for glucose, studies on..... 513
Repeated medication for curing infections.. 874
Res ipsa loquitur in malpractice cases..... 530
Resistance (or immunity) developed by the reaction to syphilitic infection..... 373
Respiration, the physiology of..... 630
Respiratory infections, vaccination against 713
Results of surgical treatment of exophthalmic goitre 63
of three years' treatment of syphilitic mothers and babies..... 259
Resuscitation and massage of the heart... 419
by heart massage—a new technique.... 356
cardiac massage in..... 514
from apparent death, adrenalin in..... 427
in death under anesthesia..... 275
Retention crypts in the infratonsillar nodules as extensive harbors of pathogenic bacteria 267
of urine, results of "forage" of the prostate for 588
Retroversion of the uterus..... 298
Rheumatic fever, acute, and chorea—effect of tonsillectomy on the recurrence of 125
treated with cinchophen, neocinchophen, and novaspirin 740
Rheumatismal conjunctivitis, treatment of 167
Rheumatism and flatfoot..... 857
Right iliac fossa pains and the end-results. 487
Ringworm of the nails..... 834
Ritual of a surgical operation..... 23
Roentgen-ray burns 61
standardized, in the treatment of skin diseases..... 274
Routes of access to the heart..... 592
Rubber goods, surgical—some toxicological aspects of 525
Rush, J. E.: Critical Comment on Current Methods of Public Education in Venereal Disease 535

Saccharin, the influence of on the catalases of the blood 129
Sacral anesthesia as applied to genitourinary surgery 823
Sacrococcygeal dermoids 904
Sailer, Joseph: Wiring and Electrolysis for Aortic Aneurism 694

Salt ingestion, the effect of on cerebrospinal fluid pressure and brain volume..... 123
Salvarsan by rectum in the form of enteroclysis 44
the pharmacological action of..... 277
the toxicity of..... 338
Salvarsanized serum injections in neurosyphilis 91
Sandstroem's glands, parathyroid hypofunction, and eclampsia—the internal secretion of 656
Saphenoperitoneal anastomosis for ascites, due to cirrhosis of liver..... 457
Sarcoma and carcinoma of the bone, radium in the treatment of..... 524
Scabies, a possible menace: its recognition and treatment 409
Scarlatina and its complications, treatment of 541
Scarlet fever and the tonsils..... 803
prognosis and treatment of..... 322
Schellberg treatment for chronic colonic infection 803
Schick reaction and the immunization of susceptibles to diphtheria with toxin-antitoxin..... 646
for the prevention of diphtheria 720
test, a study of the..... 609
importance of the in the prevention of diphtheria 177
its control, and active immunization against diphtheria 43
Scientific therapy, the basis of a..... 811
Scleroderma as a possible manifestation of chronic arsenic poisoning..... 359
Scopolamine-morphine narcosis in labor, called twilight sleep..... 280
Scurvy, infantile 410
Seasickness, the use of benzyl benzoate in.. 200
Seasonal hay fever, treatment of..... 641
Sectioning the pyloric sphincter, improved incision for the operation of..... 324
Seminal vesiculitis: its local and general manifestations 523
Senile painful hip..... 366
Sepsis, hidden 286
Septic abortion, treatment of..... 293
hand, passing of the..... 270
Serous cavities, absorption from..... 129
Serum desensitization 736
treatment of lobar pneumonia..... 737
Serums in the treatment of epidemic meningitis and pneumonia 102
Sexual potency, the restoration of..... 332
psychoneuroses 44
Shock, capillary pressure and the circulation in 886
Shoulder pain in lesions of the upper abdomen, the significance of..... 520
Silver arsphenamine 793
nitrate ointment in the treatment of vulvovaginitis in children..... 347
salvarsan and its uses..... 549
in the treatment of syphilis.... 597
Simple every-day science about yeast..... 195
method of treating flatfoot..... 376
procedure for avoiding anaphylactic shock 598
Simplified production of antimeningococcic serum 340
Sinusitis in children..... 193
Skin cancer, the x-ray in..... 393
diseases, a menace in the low protein diet in 117
treated by standardized Roentgen ray 274
grafting, the selection of donors for... 582
Skull fracture, treatment of..... 897
Sodium biborate in the treatment of epilepsy in an asylum..... 126
bicarbonate intraperitoneally..... 342
tolerance in the toxemias of pregnancy 281
bromide solution in pyelography, and its toxicity in comparison with other media 878
Some additional measures against diphtheria 250
Soya-bean flour, the nutritive value of as a supplement to wheat flour..... 665
Spastic constipation 34
Special field of neurological surgery..... 636
Spelling of chemical terms..... 608
Spellissy, Joseph M.: Topics in Orthopedic Surgery of Interest to the General Practitioner 305
Spinal anesthesia in obstetrics..... 110
concussion 562
cord tumors, surgery of the..... 295
curvature in growing children..... 668
drainage in certain mental diseases, indications for 350
puncture in diagnosis and treatment... 853
sign in gastric crises..... 141
tuberculosis, operative and non-operative treatment of 66
Spleen, surgery of the..... 446
Splenectomy, an analysis of 245 cases of... 484
in the treatment of pernicious anemia.. 432
Splenic anemia: Banti's disease..... 448
Sprue, the absence of pancreatic secretions in and the employment of pancreatic extract in the treatment of the disease 646
treatment of by massive doses of sodium bicarbonate 586
Squill as a cardiac stimulant, the value of. 95
Standardization of methods of treatment in orthopedic surgery and in industrial surgery of the extremities and spinal column 593
Stellwagen, Thomas C.: The Management of Strictures 1
Stomach dilatation, acute postoperative.... 801
Strangulated hernia in the aged..... 601
Strictures, the management of..... 1
Subdeltoid bursitis 441
Submucous operation a cause of nasal deformities 297
Suction in otolaryngology, the use of—technique of application..... 80
Sulphur in the treatment of scabies..... 409
Sun treatment of chancroids..... 871
Surgery, immunity in..... 677
of the gall-bladder and ducts, crucial points in 284
of the large intestine, a new principle in 215
of the lung and pleura..... 705
of the thorax, the knife cautery in..... 223
some laboratory contributions to..... 102
Surgical affections, treatment of by light and heat 786
operation, the ritual of a..... 23
treatment for cerebral hemorrhage in the new-born 439
of gastric ulcer..... 98
tuberculosis in children, the treatment of by venous hyperemia..... 757
non-operative treatment of..... 634
Suspension operation for varicocele..... 896
Swelling of the pinna—an early sign of deficient antiscorbutic vitamine..... 576
Swollen glands and heart block in diphtheria 573
Symptoms of disease, the theory of disturbed reflexes in the production of..... 506
Syphilis, arsenical treatment of—dermatitis and allied reactions following the.... 792
bearing of the administration of arsphenamine and neoarsphenamine upon further infection in..... 703
cerebrospinal—a point in regard to the treatment of 328
fluid in treated..... 582
complications of the arsphenamine treatment of 651
congenital—diagnosis and treatment of 806
intensive therapy of..... 134
latency of 560
of the central nervous system..... 51
of the heart..... 719
of the nervous system, modern treatment of 291
protection of the public against..... 659
provocative procedures in the diagnosis of 48
reinfection and curability of..... 116
silver arsphenamine in the treatment of 793
silver salvarsan in the treatment of.... 597
the efficiency of deep injections of mercurial preparations in..... 247
the luetin test for..... 780
the modern treatment of..... 320
the prophylaxis of..... 178
the treatment of..... 583
Wassermann-fast 296
Syphilitic infection, prophylactic treatment of 167
the resistance developed by the reaction to..... 373
mothers and babies, results of three years' treatment of..... 259

Tabes, cases examined for the oculo-cardiac reflex 622
dorsalis arising after antityphoid inoculation, symptoms resembling..... 188
treatment of 446
Temperatures in infants, obscure—the frequency of pyelitis in its relation to the nosology of 460
Test for patient's capacity for operation... 735
Tetanus and its antitoxin..... 216
—animal experimentation 102
in the British army during the European war 671
treatment of 733
Theory of disturbed reflexes in the production of symptoms of disease..... 506
Thick cereals in disorders of infancy, therapeutics of 118
Thoracic surgery, the knife cautery in..... 223
Thyroid diseases, basal metabolism as an index of treatment in..... 666
gland, diseases of the—determination of the basal metabolic rate and its value in 334
enlargement, a case of..... 476
in the treatment of myxedema..... 358
therapy 325
hypertrophy, the effect of thyroid, thymus and tethelin and a meat diet on 185
preparations 505
the secretion of the..... 900
Tissue thrombin—a new treatment of cancer 139
Tobacco and the heart..... 632
and work 868
smoke as a mouth disinfectant..... 256
the effect of on man..... 727
Tonsillar disease, the value of vaccine therapy versus tonsillectomy in..... 569
Tonsillectomy, cataclysmal hemorrhage after 654
effect of on the recurrence of acute rheumatic fever and chorea..... 125
end results of..... 281
the use of acetylsalicylic acid locally after, and in acute pharyngitis..... 840
Tonsillitis, acute lacunar—renal complications of 365
Tonsils and scarlet fever..... 803
Toothache, benzyl alcohol for..... 188
Topics in orthopedic surgery of interest to the general practitioner..... 305
Torbett, J. W.: Vaccine and Gland Therapy in Various Disorders 15
Toxemia, acute—the treatment of..... 795
of early and late pregnancy, treatment of the..... 789
Toxemias of pregnancy, sodium bicarbonate tolerance in the..... 281
Toxicity of alcoholic liquids..... 210
of alcohol, influence of dilution on the 192
of arsphenamine and neoarsphenamine, some salient facts regarding the..... 47
of salvarsan 338
Toxicological aspects of surgical rubber goods 525
Toxin-antitoxin, constitutional reaction following injection of..... 646
following Schick testing for the eradication of diphtheria 711
Transfusion in the treatment of pernicious anemia 879
of blood via longitudinal sinus, with report of cases..... 643
Traumatic fat necrosis of the female breast and its differentiation from carcinoma.... 224
Treponema pallidum, two strains of the.... 143
Truths and fallacies about appendicitis.... 229
Tubercular arthritides, treatment of..... 309
Tuberculin, the appropriate dose of..... 341
Tuberculosis, abdominal, in children..... 860
and its relation to industrial medicine.. 262
chaulmoogra oil in the treatment of... 717
food values in..... 188
intestinal 884
of the hip 135
of the spine, operative and non-operative treatment of..... 66
psychotherapy of..... 890
pulmonary—blood transfusion in the treatment of 418
—certain points in the diagnosis and treatment of 56
—chlorine in the treatment of..... 156
—extrapleural thoracoplasty in the treatment of 144
Tuberculosis, pulmonary—induced pneumothorax in the treatment of..... 648
—the results of induced pneumothorax in the treatment of..... 137
—the x-ray as a guide for producing pneumothorax in..... 148
surgical, in children—treatment of by artificial venous hyperemia....545, 757
—non-operative treatment of..... 634
treatment of by Friedmann's method... 363
Tumors of the spinal cord, surgery of..... 295
radium in the treatment of..... 313
Twilight sleep 555
in labor 280
Typhoid and paratyphoid fever, a new method in the treatment of..... 682
vaccine as a preventive measure..... 511

Ulceration in the duodenum..... 599
Ulcer, gastric, and its treatment..... 751
—surgical treatment of..... 98
—treatment of..... 821
Ulcers, gastric and duodenal.....137, 345
and duodenal—treatment of..... 492
Umbilical and ventral hernia..... 289
Ununited fracture of the neck of the femur, reconstruction operation of..... 819
Unusual case of lead poisoning..... 152
forms of poisoning..... 484
Upper jaw and antrum, malignant growths of the 519
Urea, creatinine, and chlorides—the influence of diuresis on the elimination of..... 126
Urethritis, chronic—treatment of..... 377
Uric acid excreted in the urine after atophan, source of the..... 409
Urinary incontinence, treatment of by electrical methods 827
Urine formation in man, effect of pituitary extract on the rate of..... 740
Use and misuse of the curette..... 444
Uselessness of antimony in the treatment of filariasis 112
Uterine cancer, inoperable—treatment of... 502
displacement, treatment of..... 202
hemorrhage not associated with pregnancy, the treatment of..... 568
the use of pituitrin by mouth in certain cases of..... 741
polyps 761
retroversion 298

Vaccination against influenza and some other respiratory infections..... 713
with massive dose of bacillus typhosus. 511
Vaccine and gland therapy in various disorders 15
for the cure of hernia..... 456
therapy for preventing whooping-cough in public institutions..... 647
in gonorrhea 739
versus tonsillectomy in systemic disease of tonsillar origin..... 569
treatment of asthma.....689, 872
of infective arthritis and allied conditions 807
Vaccines, autogenous, in the treatment of myositis, neuritis, and arthritis..... 261
hay-fever pollens, and proteids, misuse of 716
Vaginal displacement, different styles of pessaries for 5
Value of local anesthesia in the surgery of to-day, an estimate of the..... 830
of squill as a cardiac stimulant..... 95
Valvular heart disease, mechanical aspects of acquired chronic..... 841
Varicocele, suspension operation for..... 896
Varicose veins, treatment of..... 53
Various operative procedures indicated by goitre 898
tests in the study of renal diseases, a series of cases illustrating the use of. 467
Vascular nevi, treatment of with radium... 219
V colon, the mobile..... 757
Venereal disease, control of..... 376
critical comment on current methods of public education in 535
prophylaxis 254
infection, the conquest of..... 214
Venous hyperemia in the treatment of surgical tuberculosis in children..... 757
Ventral and umbilical hernia..... 289

Vesical neck hyperesthesia in women..... 367
Vesiculitis, seminal; its local and general manifestations 523
Virulent diphtheria bacilli carried by cats.. 147
Vitamine content of honey..... 714
Vitamines and their relationship to health and disease 768
experiments on 567
in foods 848
possibly five instead of three..... 847
the need of..... 268
three forms of..... 190
—what they are and what they do..... 278
Volatile oils, carminative action of..... 34
the carminative effects of on muscular movements of the intestine 257
Volume changes of the cerebrospinal fluid after adrenalin, pituitrin, pilocarpine, and atropine 792
Vomiting in pregnancy, treatment of by adrenalin 649
Vulvovaginitis in children, silver nitrate ointment in the treatment of..... 347

Wagers, Arthur J.: The Use of Suction in Otolaryngology—Technique of Application 80
War and the heart..... 49
work of the Rockefeller Institute..... 102
Warning against orange beverages for medicinal purposes 269
Wassermann-fast syphilis 296
reaction, effect of mercury salicylate on the 119
Water in the diseases of childhood..... 131
Water soluble antineuritic vitamine, test for the 850
B vitamine, test for the..... 851
C vitamine, test for the..... 852
treatment of diarrhea in infancy..... 639
What are vitamines? and what they do..... 278
Whitfield's ointment in the treatment of ringworm of the nails..... 834
Whooping-cough, antipyrin in the treatment of 239
in public institutions, vaccine therapy for preventing..... 647
Wiring and electrolysis for aortic aneurism 694
Work and tobacco..... 868

X-ray and radium treatment of the thyroid 901
after inflation of the pelvic cavity..... 894
as an essential guide for producing artificial pneumothorax in advanced cases of pulmonary tuberculosis..... 148
burns treated with radium..... 215
findings in heart disease, the value of.. 844
in the treatment of acne..... 431
or radium in the postoperative treatment of cancer..... 393
the penetrating power of..... 526
treatment of goitre..... 428

Yeast in bread, the nutritive value of..... 720
simple every-day science about..... 195
Yellow fever, prophylaxis and serum therapy of 854
Young children and infants, empyema in.... 342
Youth, restoring the vigor of..... 332

BOOK REVIEWS.

American Year Book of Anesthesia and Analgesia 301
Ames, Fisher: The American Red Cross Work Among the French People..... 302
Anders, James M.: A Text-book of the Practice of Medicine..... 228
Anspach, Brooke M.: Gynecology..... 379
Bandler, Samuel Wyllis: The Endocrines... 73
Bergey, D. H.: The Principles of Hygiene.. 453
Boothby, Walter M., and Sandiford, Irene: Basal Metabolic Rate Determination..... 76
Boyd, Mark M.: Practical Preventive Medicine 75
Bradby, M. K.: Logic of the Unconscious Mind 301
Bulkley, L. Duncan: Cancer and Its Non-Surgical Treatment 605
Burr, C. B.: Practical Psychology and Psychiatry 228
Campbell, William Francis: A Text-book of Surgical Anatomy 909
Carman, Russell D.: The Roentgen Diagnosis of Diseases of the Alimentary Canal..... 228
Carter, Herbert S., and Howe, Paul X.: Nutrition and Clinical Dietetics..... 604
Chetwood, Charles H.: The Practice of Urology 911
Clubbe, Charles P. B.: The Diagnosis and Treatment of Intussusception..... 607
Collected Papers of the Mayo Clinic..... 75
Cope, Zachary: Surgical Aspects of Dysentery, Including Liver Abscess..... 304
Crile, George W.: A Physical Interpretation of Shock, Exhaustion, and Restoration... 451
Dana, Charles L.: A Text-book of Nervous Diseases 74
Davis, A. Edward, and Douglass, Beaman: Eye, Nose and Throat Nursing..... 380
Dayton, Hughes: Practice of Medicine..... 605
Elliott, Robert Henry: Tropical Ophthalmology 227
Fitch, William Edward: A New Pocket Medical Formulary 452
Fortescue-Brickdale, J. M.: A Text-book of Pharmacology and Medical Treatment for Nurses 76
Fuller, Sir Bampfylde: The Science of Ourselves 452
Gabell, Douglas: Prosthetic Dentistry..... 760
Garrison, Fielding H.: History of Medicine 910
Glaister, John: A Text-book of Medical Jurisprudence and Toxicology..... 760
Grover, Burton B.: The Handbook of Electrotherapy for Students and Practitioners 449
Hay, John: Graphic Methods in Heart Disease 449
Heitzmann, Lewis: Urinary Analyses and Diagnosis by Microscopical and Chemical Examination 606
Hess, Julius H.: The Principles and Practice of Infant Feeding..... 151
Hill, Lewis Webb, and Eckman, Rena S.: The Allen or Starvation Treatment of Diabetes 606
Horder, Sir Thomas: Medical Notes..... 449
Humphris, Francis Howard: Electrotherapeutics for the Practitioner..... 450
Hurst, Arthur F.: The Psychology of the Special Senses and Their Disorders..... 301
Index Catalogue of the Library of the Surgeon-General's Office, United States Army 759
International Medical Annual..... 759
Jansen, Murk: Feebleness of Growth and Dwarfism 450
Johns Hopkins Hospital Reports.....75, 303
Jones, Sir Robert: Injuries to Joints..... 529
Kanavel, Allen B.: Infections of the Hand.. 911
Karsner, Howard T., and Ecker, Enrique E.: The Principles of Immunology..... 379
Keen's Surgery. Edited by W. W. Keen... 528
Kidd, Frank: Common Infections of the Kidneys 74
Labbé, Marcel: Le Diabète Sucré, Études Cliniques, Physiologiques et Thérapeutiques 299
Lumb, Norman: The Systematic Treatment of Gonorrhea in the Male..... 151
MacCallum, W. G.: A Text-book of Pathology 225
McCarrison, Robert: Studies in Deficiency Disease 680
McConnell, Guthrie: A Manual of Pathology 75
McGrath, John J.: Operative Surgery..... 529
Macarthur, John: A Mental Hospital Manual 759
Martindale and Westcott: The Extra Pharmacopœia 454
Medical Clinics of North America..151, 300, 452
Medical Record Visiting List and Physician's Diary for 1922..... 910
Monrad-Krohn, G. H.: Clinical Examination of the Nervous System..... 682
Moorhead, John J.: Traumatic Surgery..... 455
Morrow, Albert S.: Diagnostic and Therapeutic Technique 303
Moynihan, Sir Berkeley: Essays on Surgical Subjects 760
Moynihan, Sir Berkeley: The Spleen and Some of Its Diseases..... 908
Optimistic Medicine. By a Former Insurance Man 304
Ormsby, Oliver S.: A Practical Treatise on Diseases of the Skin..... 606
Orthopedic Surgery of Injury. Edited by Sir Robert Jones..... 454
Osborne, Oliver T.: The Principles of Therapeutics 452
Oxford Medicine. Edited by Henry A. Christian and Sir James Mackenzie...302, 758
Physician's Perfect Call List and Record for 1922 910
Prentiss, Charles William: A Laboratory Manual and Text-book of Embryology... 227
Progressive Medicine. Edited by H. A. Hare 150, 379, 682, 908
Ramsay, A. Maitland: Clinical Ophthalmology for the General Practitioner..... 226
Ranson, Stephen W.: The Anatomy of the Nervous System from the Standpoint of Development and Function..... 300
Roberts, John B., and Kelly, James A.: Treatise of Fractures in General Industrial and Military Practice..... 607
Roger, G. H.; Widal, Fernand; Teissier, P. J.: Nouveau Traite de Medecine..... 453
Rudolph, Robert Dawson: Notes on the Medical Treatment of Disease..... 225
Sabourin, Charles: Rational Treatment of Pulmonary Tuberculosis 380
Sherwood-Dunn, B.: Regional Anesthesia.. 149
Smith, S. Calvin: Heart Affections: Their Recognition and Treatment..... 150
Stelwagon, Henry W.: A Treatise on Diseases of the Skin for Advance Students and Practitioners 909
Stengel, Alfred, and Fox, Herbert: A Text-book of Pathology..... 528
Surgical Clinics of Chicago..... 76
Thérapeutique Clinique. Edited by Alfred Martinet 604
Thompson, Loyd: Syphilis..... 72
Tidy, Henry L.: A Synopsis of Medicine.... 227
Tousey, Sinclair: Medical Electricity, Roentgen Rays and Radium..... 527
Wells, H. Gideon: Chemical Pathology..... 73
Ziegler, Ernst: General Pathology..... 226